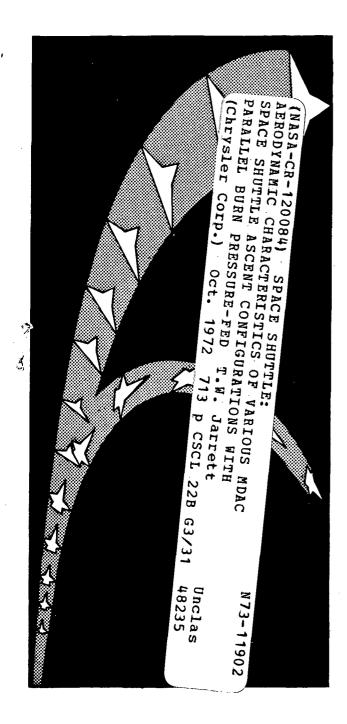
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DMS-DR-1230 CR-120,084 OCTOBER 1972



SADSAC SPACE SHUTTLE
AEROTHERMODYNAMIC
DATA MANAGEMENT SYSTEM

CONTRACT NAS8-4016
MARSHALL SPACE FLIGHT CENTER



-SPACE SHUTTLE-

AERODYNAMIC CHARACTERISTICS
OF VARIOUS MDAC SPACE
SHUTTLE ASCENT CONFIGUR—
ATIONS WITH PARALLEL BURN
PRESSURE-FED AND SRM BOOSTERS

VOLUME II
TANK T3 CONFIGURATIONS

by
T. W. Jarrett, MDAC



This document should be referenced as NASA CR-120,084 NASA Series Number: S-0441

DMS-DR-1230 VOLUME II CR-120,084 OCTOBER, 1972

SADSAC/SPACE SHUTTLE

WIND TUNNEL TEST DATA REPORT

CONFIGURATION:	MDAC Pressure Fed and SRM Parallel Burn Ascent Configurations
TEST PURPOSE:	To Define the Aerodynamic Characteristics of an Ascent
	Configuration, the Individual Component Contribution,
4 - 1	Relative Orbiter and Booster Position and Interference Effects
TEST FACILITY:	MDAC Aerophysics Lab. 4 Foot Trisonic Wind Tunnel
TESTING AGENCY:	MDAC (W)
TEST NO. & DATE:	S-222; 2 Dec. 1971 - 18 Jan. 1972, 25 Jan. 1972 - 8 Feb. 1972
FACILITY COORDINA	TOR: T. W. Jarrett, MDAC
PROJECT ENGINEER(S): T. W. Jarrett, MDAC

DATA MANAGEMENT SERVICES

for T. L. Mulkey DATA OPERATIONS: W. R. Morgan

RELEASE APPROVAL: J. J. Supervisor

Aero Thermo Data Group

CONTRACT NAS 8-4016

AMENDMENT 174

DRL 297-84a

This report has been prepared by Chrysler Corporation Space Division under a Data Management Contract to the NASA. Chrysler assumes no responsibility for the data presented herein other than its display characteristics.

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AERODYNAMIC CHARACTERISTICS OF VARIOUS MDAC SPACE SHUTTLE ASCENT CONFIGURATIONS WITH PARALLEL BURN PRESSURE-FED

AND SRM BOOSTERS (M = 0.4 - 4.5)

By

T. W. Jarrett

INTRODUCTION

Various space shuttle ascent configurations were tested in the MDAC Aerophysics 4 x 4 Ft. Trisonic Wind Tunnel. The models were 0.6 percent scale. The ascent configurations consisted of a NASA/MSC 040A orbiter in combination with various HO centerline tank and booster geometries. The purposes of the tests were to determine the aerodynamics of the ascent configurations, the aerodynamic interference between components and its effect on orbiter aerodynamics, and to determine orbiter aileron effectiveness.

The model was sting mounted with either a single internal balance (in the orbiter HO tank) or dual internal balances (one in the orbiter and one in the orbiter HO tank). With the dual balance setup, three types of runs were made; one with tank alone on the tank balance, one with tank and two attached boosters on the tank balance, and one with the tank and one booster attached on the tank balance and the other booster isolated on a separate sting but in proximity to the tank and orbiter. In addition to the 6-component force and moment balance data, base pressure data were taken for the boosters, the tank and the orbiter. Angle of attack data included α sweeps at 0° and 6° β (the latter involving a knuckle change) and β sweeps at 0° and 6° α . Through the use of a remote roll device it was usually possible to get both an α sweep and a β sweep in a single run.

INTRODUCTION (Continued)

The report consists of five volumes arranged in the following manner:

Volume I	Ascent configurations with centerline HO tanks T_1 and T_2
Volume II	Ascent configurations with centerline HO tank T ₃
Volume III	Ascent configurations with centerline HO tank T_{\downarrow}
Volume IV	Ascent configuration plume studies and configuration buildup
Volume V	Orbiter alone, Tanks alone and

Boosters alone

NOMENCLATURE General

•	SADSAC	
SYMBOL	SYMBOL	DEFINITION
a		speed of sound; m/sec, ft/sec
Ср	CP	pressure coefficient; $(p_1 - p_{\infty})/q$
M	MACH	Mach number; V/a
p		pressure; N/m ² , psf
q	Q(NSM) Q(PSF)	dynamic pressure; $1/2\rho V^2$, N/m^2 , psf
rn/l	\mathtt{RN}/\mathtt{L}	unit Reynolds number; per m, per ft
v	•	velocity; m/sec, ft/sec
α	ALPHA	angle of attack, degrees
β	BETA	angle of sideslip, degrees
ψ	PSI	angle of yaw, degrees
$oldsymbol{\phi}$	PHI	angle of roll, degrees
ρ		mass density; kg/m^3 , $slugs/ft^3$
	<u>R</u>	eference & C.G. Definitions
Ab		base area; m ² , ft ²
ъ	BREF	wing span or reference span; m, ft
c.g.		center of gravity
$m{\ell}_{ ext{REF}}$	LREF	reference length or wing mean aerodynamic chord; m, ft
S	SREF	wing area or reference area; m ² , ft ²
	MRP	moment reference point
	XMRP	moment reference point on X axis
	YMRP	moment reference point on Y axis
	ZMRP	moment reference point on Z axis
SUBSCRII b 1 s t	PTS	base local static conditions total conditions free stream

NOMENCLATURE (Continued) Body-Axis System

SYMBOL	SADSAC SYMBOL	DEFINITION
c^{N}	CIN	normal-force coefficient; normal force
$c_{\mathbf{A}}$	CA	axial-force coefficient; axial force
$c_{\mathbf{Y}}$	CY	side-force coefficient; side force qS
${^{\text{C}}\!A}_{b}$	CAB	base-force coefficient; base force
		$-A_b(p_b - p_{\infty})/qS$
$\mathtt{c}_{\mathtt{A_f}}$	CAF	forebody axial force coefficient, C_A - C_{A_b}
$C_{\mathbf{m}}$	CLM	pitching-moment coefficient; pitching moment qSIREF
c_n	CYN	yawing-moment coefficient; yawing moment qSb
c 1	CBL	rolling-moment coefficient; rolling moment qSb
		Stability-Axis System
$\mathrm{c}_{\mathbf{L}}$	CL	lift coefficient; $\frac{11ft}{qS}$
CD .	CD	drag coefficient; drag
$^{\mathrm{C}}_{\mathrm{D}_{\mathrm{D}}}$	CDB	base-drag coefficient; base drag
$\mathtt{c}_{\mathtt{D}_{\mathbf{f}}}$	CDF	forebody drag coefficient; C_D - C_{D_b}
$c_{\mathbf{Y}}$	CY	side-force coefficient; $\frac{\text{side force}}{qS}$
C_{m}	CLM	pitching-moment coefficient; pitching moment qs/REF
c_n	CLN	yawing-moment coefficient; yawing moment qSb
с /	CSL	rolling-moment coefficient; rolling moment qSb
L/D	r/d	lift-to-drag ratio; $c_{ m L}/c_{ m D}$

ADDITIONS TO NOMENCLATURE

SYMBOL	SADSAC SYMBOL	DEFINITION
$c_{\mathbf{L}}^2$	CLSQR	lift coefficient squared.
δa	AILRON	aileron, total aileron deflection angle, degrees, (left aileron-right aileron)/2.
∂ e	ELEVON	elevon, surface deflection angle, positive deflection, trailing edge down; degrees.
6 _r	RUDDER	rudder, surface deflection angle, positive deflection, trailing edge to the left; degrees
∂ rf	RUDFLR	rudder flare, split rudder deflection angle, left split rudder trailing edge left and right split rudder trailing edge right, $\delta_{rf} = (\delta_{rL} + \delta_{rR})/2$, positive deflection; degrees.

CONFIGURATIONS INVESTIGATED

The wind tunnel models were 0.6 percent scale models and included one orbiter configuration, four tank configurations, and seven booster configurations. The orbiter centerline HO propellant tanks included variations in diameter (302 and 325 in.), nose cone angle (10° and 15°), and axial position (120 inch travel). Of the boosters, three were solid rocket motors with the remainder being pressure fed boosters. The pressure fed boosters included variations in diameter (206 and 248 inch), nose cone angle (15° and 20°) and base flare (5° and 15°). The solid rocket motors included variations in diameter (156 and 120 in.) and base flare (0° and 15°) for the 156 in. motor.

In addition, simulated rocket plumes were tested at M = 1.5 and 2.2 for both pressure fed and solid rocket motor boosters. These plumes were made up of three solid aluminum bodies each of which represented an envelope of individual engine plumes for the orbiter and each booster. These envelopes were generated by taking the outermost plume boundary of the outermost engine for each component and rotating this boundary about the null thrust vector of the component (orbiter or booster). The individual engine plumes were generated at MSC with the plume boundary defined by a method of characteristics solution with the flow field originating at the exit plane, and the effects of the external flow on the boundary calculated by Newtonian impact theory.

The contours of the various plumes tested are defined in Table 4 and Figure 43 through 46. The matrix of plume testing was as follows:

CONFIGURATION	BOOSTER PIUME	ORBITER PIUME	M_{TEST}
OlTlBl	LOX/PROP M = 2.5	4 ENG. J2S M = 2.5	2.2
OlTlBl	LOX/PROP M = 1.5	3 ENG. HiPc $M = 1.5$	1.5
O_1 T $_1$ B $_1$	LOX/PROP M = 1.5	3 ENG. HiPc $M = 1.5$	2.2
0 ₁ T ₃ B ₆	156" SRM M = 1.5	3 ENG. HiPc $M = 1.5$	1.5
0 ₁ T ₃ B ₆	156" SRM M = 2.2	3 ENG. HiPc $M = 2.2$	2.2
0 <u>1</u>	120" SRM M = 1.5	3 ENG. HiPc M = 1.5	1.5
O ₁ T4B7A ₁ _4	120" SRM M = 2.2	3 ENG. HiPc M = 2.2	2.2

Symbols for Orbiter Configuration:

Symbol	Description
Ol Wl Bl El Vl V2 V _{OFF}	WlBlFlV2R2PlMlCO Wing Body Elevon Centerline vertical (Replaces V2R2) Centerline vertical No centerline vertical
CO R1 R2 P1 M1 C1 C2	Canopy Rudder for V1 Rudder for V2 ACPS Engine Pod OMS Engine Pod Cupola Canopy Off (Replaces CO)
Symbols for Tanks	
Symbol	Description
т ()	Tank complete
T ()a	Tank complete at an alternate position with respect to the boosters and orbiter
Fl	Fin for T ₄
Symbols for Boosters:	
Symbol	Description
B () S F4 A	Boosters complete Skirt for booster Fins for B ₄ Thrust vectoring fuel tank for B ₇
Symbols for Plumes:	
Symbol	Description
+ Plume (2.5)	3 Plumes (Orbiter + 2 Boosters) at M = 2.5
+ Plume (1.5)	3 Plumes (Orbiter + 2 Boosters) at M = 1.5
+ Plume (2.2)	3 Plumes (Orbiter + 2 Boosters) at M = 2.2

TEST FACILITY

The MDAL 4' Trisonic Wind Tunnel facility is a blowdown type operation capable of Mach numbers of 0.2 to 5.0 and Reynolds numbers from approximately 1 x 10⁶ to 2 x 10⁶ per inch. The subsonic and transonic Mach numbers are run in a porous wall test section which is removed for supersonic testing. The supersonic test section utilizes a two dimensional flexible plate nozzle to obtain Mach numbers 1.5 to 5.0. The models are mounted on a sting that is supported from a vertical translating strut with a vertical plane rotating pod having a pitch range of -15° to +25° when no offset adapters are present.

MODELS AND SUPPORT EQUIPMENT

The test models with all of their interchangeable component parts were 0.60 percent of full scale.

The orbiter model had a blended body contoured into a low delta wing. Effects of orbiter position and booster relative to the tank was investigated at two longitudinal locations on the tank (nominal and aft). The orbiter and boosters can be bolted to the tank (T1) in both nominal and aft positions as well as independently mounted from the tank. For the bolted orbiter case, the orbiter balance was inoperative and there were no force or moment data for the orbiter.

Effects of the orbiter control surfaces and control surface deflections were investigated for elevons, ailerons, and rudder with the surfaces deflected and undeflected.

Transition strips of No. 120 carborundum grit were used to insure boundary layer transition from laminar to turbulent flow. These strips were 3/32 inches wide and were located 3/4 inches aft of the orbiter nose, 1/2 inch aft of the booster nose, 1/2 inch aft of the tank nose, and at 5 percent local chord (both surfaces) on the wings, vertical tails and fins.

To achieve the required test angles of attack and sideslip two straight balance adapters were used in combination with the MDAL 6 degree sting adapter. A straight sting section positioned the model properly in the test section.

Pressure data for the orbiter, tank or the booster were obtained from base and balance cavity pressure pickups that were cantilevered off the sting. Leads for these pickups were routed externally over the model support system and into the tunnel strut. The boosters in the presence of the tank each had a base pressure pickup.

DATA REDUCTION

The data are corrected for such factors as model tares, sting bending and balance deflections, interactions, and bilinearities.

Composite Configurations

- 1. The orbiter data were reduced about the orbiter MRP using its reference dimensions and about the tank MRP, using orbiter reference dimensions (5 for longitudinal and b for lateral).
- 2. The tank data were reduced about the tank MRP using orbiter reference dimensions (c for longitudinal and b for lateral).
- 3. A <u>summation</u> of the orbiter (tank MRP) and tank (tank MRP) data with all data corrected for angular attitudes to the tank body axes.

Orbiter Alone Configurations

1. The orbiter data were reduced about the orbiter MRP using the orbiter reference dimensions (c̄ for longitudinal and b for lateral).

Tank Alone Configurations

1. The tank data were reduced about the tank MRP using the orbiter reference dimensions.

Booster Alone Configurations

1. The booster data were reduced about the booster MRP using the orbiter reference dimensions.

Ascent configuration composite tank MRP data, orbiter alone data, tank alone data and booster alone data are presented in this report, with the remaining data on file and available upon request.

Reference quantities used in these data reductions are as follows:

ORBITER

Quantity	Full Scale Dimensions (Reference only)	Model Dimensions
Reference Area (S)	3155.3 Ft ²	16.37 In ²
Reference Span (b)	882 In.	5.292 In
Reference MAC (c)	609.5 In.	3.657 In
Moment Reference Points		See Figures 13 & 14

DATA REDUCTION (CONTINUED)

Areas:		
Total Base (AB)	298 Ft ²	1.546 In ²
	TANK	
Quantity	Full Scale Dimensions (Reference only)	Model Dimensions
Reference Area (S)	3155.3 Ft ²	$16.37 in^2$
Reference Length (b)	882 In.	5.292 in.
Reference Length (c)	609.5 In.	3.657 in.
Moment Reference Points		See Figures 13 & 15
Areas:		•
Total Base (AB)/Tank	Tl - 422 Ft ²	2.125 In ²
	T2 - 422 Ft ²	2.125 In ²
	T3 - 518 Ft ²	2.613 In ²
	T4 - 537 Ft ²	2.785 In ²
	BOOSTER	
<u>Quantity</u>	Full Scale Dimensions (Reference only)	Model Dimensions
Reference Area (S)	3155.3 ft ²	$16.37 in^2$
Reference Length (b)	882 in.	5.292 in.
Reference Length (c)	609.5 in.	3.657 in.

See Figures 13 & 16 through 19

Moment Reference Points

DATA REDUCTION (CONTINUED)

Areas:

Total Base	$(A_B)/Booster$	Bl	-	901.0 Ft ²	4.539 In ²
· ·		BlSl	-	2125 Ft ²	11.0093 In ²
		B1S2	-	4785 Ft ²	24.7887 In ²
		B 2	-	137.8 Ft ²	0.694 In ²
	•	B2S	-	428 Ft ²	2.158 In ²
		B 3	-	902 Ft ²	4.545 In ²
		В ¹ 4	-	568 Ft ²	2.865 In ²
		B5	_	55 7 Ft²	2.883 In^2
		в6	-	95.4 Ft ²	0.481 In ²
		В7	_	79.3 Ft ²	0.408 In ²

TABLE 1.

TEST CONDITIONS
TEST S-222

MACH NUMBER	REYNOLDS NUMBER per (inch)	DYNAMIC PRESSURE (pounds/sq. inch)	STAGNATION TEMPERATURE (degrees Fahrenheit)
0.4	0.50 x 10 ⁶	3•3	53
0.6	0.83 x 10 ⁶	7.6	47
0.7	0.74 x 10 ⁶	7.8	68
0.9	0.79 x 10 ⁶	10.0	50
0.95	0.67 x 10 ⁶	8.8	53
1.05	0.69 x 10 ⁶	9.5	50
1.1	0.69 x 106	9.8	52
1.5	0.63 x 10 ⁶	10.0	55
2.2	0.63 x 10 ⁶	9.9	68
2.25	0.94 x 10 ⁶	14.0	52
2.5	0.66 x 10 ⁶	10.3	91
4.5	1.15 x 10 ⁶	10.6	120
		:	

BALANCE UTILIZED: See	Listing on next page.	· · · · · · · · · · · · · · · · · · ·
CAPACITY:	ACCURACY:	COEFFICIENT TOLERANCE:
NF	·	
SF		
AF		·
PM		
YM		
RM		

COMMENTS:

TABLE 1.
TEST CONDITIONS (CONTINUED)

BALANCES UTILIZED

Several balances were required during the test. Listed below are the balances used, their capacity and the corresponding tunnel runs which apply to each.

BALANC	ES
--------	----

	Orbiter 3/4" D.	Tank Balance
Runs 1-10 Runs 11-113 Runs 114-184 Runs 185-197 Runs 198-270 Runs 271-420 Runs 421-424 Runs 425-459 Runs 460-474 Runs 475-569 Runs 570-646	#7 DAL - #5 DAL - #58 DAL #58 DAL	#13 NAR #13 NAR #13 NAR #13 NAR #13 NAR #11 DAL

Balance	MK. 31A 3/4" D.#7 DAL	MK. 2A 3/4" D.#5 DAL	MK. 10 3/4" D.#58 DAL	MK. 7 1" D.#13 NAR	MK. 3C 1" D. #11 DAL
Gage			Capacity		
NF (each) 2 gages	100 lb.	100 lb.	100 lb.	500 lb.	250 lb.
SF (each) 2 gages	100 lb.	50 lb.	100 lb.	300 lb.	250 lb.
AF	80 lb.	25 lb.	50 lb.	500 lb.	150 lb.
RM	20 in.lb.	60 in.lb.	40 in.1b.	150 in.lb	. 150 in.lb.

ORBITER @ ORBITER MRC

(\$1) ORBITER ISOLATED ON SEPARATE BALANCE.
(BXX) BOOSTER ISOLATED
WITHOUT 'A BALANCE.

POSTTEST PRETEST

	SCREDULES	a or B	-,	C.W	-	120	//9	811	//7	116	115	114	113	112	///	110	109	108	107	106	105	104	103	102	RD7101	DENTIFIER	DATA SET	
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PRETEST

TABLE 2.

SCHEDULES	g or B	COEFFICIENTS	 - - -		140	129	138	137	136	/35	134	135	132	/ 3/	130	129	128	127	126	125	124	123	.122	RD7/21		DATA SET	•
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		23	207 223	N.	 		<u> </u>			2	0	0	0	10		<	2	152
				417			11/4	4/5	-	W	0	0	0	Ü	0		1	151
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	235	234	2							2	0	0	0	76		<	9	149
				365	364	363	362	361	360	6	0	0	0	0			8	gh!
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				403			404	405	<u> </u>	W	10	0	0	B	0	~	7	141
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SET CONFIGURATION SCHID. CONTROL DEFLECTION OF CONTROL DEFLECTION OF CONFIGURATION NO. MACH NUMBERS 1761 $(\phi_1 VI)$ 72 355 σ B $\frac{1}{2}$ \frac	SET CONFIGURATION SCHID. CONTROL DEFLECTION NO. TACH NUMBERS IF IER CONFIGURATION α β	L				4/2		413			Wi			0	0	4		165
SET CONFIGURATION SCHID. CONTROL DEFLECTION NO. RUNS O.4 O.6 O.9 O.75 1.05 1.1 1.5 $\stackrel{?}{?}$ 2.225 PIGIT CONFIGURATION RUNS O.4 O.6 O.9 O.75 1.05 1.1 1.5 $\stackrel{?}{?}$ 2.25 PIGIT ($\stackrel{?}{?}$ 1.17 1.285 0.7 0.7 0.7 0.7 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9	SET CONFIGURATION SCHU. CONTROL DEFLECTION NO. IFIER CONFIGURATION a b b d d d d d d			~	13						_		 —	0	Z	6) TZA	164
SET CONFIGURATION SCHID. CONTROL DEFLECTION NO. PACH NUMBERS PACH NU	SET CONFIGURATION SCHU. CONTROL DEFLECTION NO. IFIER CONFIGURATION α β					1114		7/10			W	7		0	D	0		163
SET CONFIGURATION SCHIP. CONTROL DEFLECTION NO. A B $\overline{J}A$ $\overline{J}E$ $\overline{J}R$ RUNS O.4 O.6 C.9 C.75 1.05 1.1 1.5 2.2 2.25 1.1 ($\overline{J}A$) 7.2 $\overline{B}B$ O D O O O 3 408 407 406	SET CONFIGURATION SCHID. CONTROL DEFLECTION NO. MACH NUMBERS IFIER CONFIGURATION α β βA βE βC RUMS $O.4$ $O.6$ $C.6$ $C.6$ $C.7$					11/4		110			W				0	Ž)72A	162
SET CONFIGURATION SCHEEL CONTROL DEFLECTION NO. NACH NUMBERS of CONFIGURATION a b f	SET CONFIGURATION SCHIP. CONTROL DEFLECTION NO. MACH NUMBERS IFIER CONFIGURATION $\frac{\alpha}{\alpha}$ $\frac{\beta}{\beta}$ $\frac{1}{\beta}$ 1					406			408		W	0			-	0	728	77161
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CONFIGURATION SCIID. CONTROL DEPLECTION NO.				•		ı												αorβ
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CONFIGURATION CONTROL DEFLECTION 100.	757	. 67	61		5.5	49		43	37		31	-	2.5		19	1 3	7	
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CONFIGURATION CONTROL DEFLECTION NO. CONTROL DEFLECTION NO. CONTROL DEFLECTION NO. CONTROL DEFLECTION NO. CONTROL NO.			8	4						N	0	-	-	0	7			198
CONFIGURATION CONFIGURATION CONTROL DEPLECTION Of C+9 C				W				•				-	20	0	4			197
CONFIGURATION CONTROL DEFLECTION NO. MACH NUMBERS				2									0	\mathcal{F}	0		/	196
CONFIGURATION CONTROL DEFLECTION Of Off	<u> </u>										0	 		0	7	:	(Ø1)7	195
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			320							_		├	0	6) <i>B3</i>		194
CONFIGURATION SCIID CONTROL DEFLECTION NO			319								0			9	D			193
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			***************************************		358		350			10			-	Ø	0			192
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		284	285		358		35%			1		-	-	0	\cong	B		191
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			3/8		:					12		 	-	0	4		*	190
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $					357		355	356		w		ļ	<u>.</u>	B	0		. ,	184
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		244	286		357		355			6	0	 	+	0	4		P.—	881
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		302	303							10			 	0	-	(BZL)8	(Ø1)73	187
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		30/	300							N	-		╁─	0	A	/		186
CONFIGURATION SCIID. CONTROL DEFLECTION OF OLGONIS VACH NUMBERS (ϕ_1) 73 (812) 81R A G					353		354			12			0	6	0			185
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		797	299		353		354			7		-	0	7)		821	(61)13	184
CONFIGURATION SCIID. CONTROL DEFLECTION OF OF O.6 O.9 O.55 J.O5 J.J J.5 2.2 2.25 (ϕ_I) 73 (81L) 81R A C O O O J S S S S S S S S S					352		35/			W		-	0	D	0		-	183
CONFIGURATION SCHOL BEFLECTION OF MACH NUMBERS α β δA $\xi \varepsilon$ $\xi \varphi$ Runs $\alpha \varphi$ $\alpha $	į .	297	296		352		35/			ر ان		-	0	0	4	8	(Ø1)7	182
CONFIGURATION SCHOOL DEFLECTION NO. MACH NUMBERS $\frac{ S }{\alpha} \frac{ S }{\beta} S+ S- $			326							_	0	Ļ		0	4	\sim	73	18/508
SCHO. CONTROL DEFLECTION NO. MACH NUMBERS		!;	.2 2:			45	0	0	0	RUN	10				ρ) RAI LON	CONLICO	DENTIFIER
	-			S	NUMBER	MACH				ON NO.	LECTI	L DEF	ONTRO		SCI	ואס דידי א פדי	CONETCI	DATA SET
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TABLE 2. TEST

CONFIGURATION CONFIG				•		, ,										ES	SCHEDULES
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SET CONFIGURATION Configuration Configura			<u> </u>	<u> </u>	-	<u></u>			•	1	-		-	ŀ		L	
SET CONFEGURATION	75.76	67	61		5.5	64		4 3	37		31		25		19 .	7]-
SET CONFIGURATION		569	557		493	 	14			1	-	0	0	المحد ا	-		103
SET CONFIGURATION				556			 	496	. -	N	-		-	-	-		102
SCIT CONFIGURATION C.I.D. CONTROL DEFLECTION No.				556				196		12	 	-				(01)7186	101
SCIII CONFIGURATION SCIIII CONTROL DEFLECTION OF OFF O		565	564					ļ 		W		 -		-	-)72 B	189
SCII CONFIGURATION SCIII CONTROL DEPLECTION NO. STAPLES SCIII NO.		567	562	55%						l.i	-	<u> </u>	 				188
SET CONFIGURATION CONTROL DEPLECTION NO.		567	562							W			-	-		\sim	187
SET CONFIGURATION SCIID. DEPLECTION NO.		566	563	828						W	-	-	-	0		7	186
SET CONFIGURATION CONTROL DEFLECTION NO. NACH NUMBERS NA		315	316							17	 	-	-	0/	_		185
SET CONFIGURATION SCIID. FONTROL DEPLECTION NO. NACH NUMBERS NO.			-		1344		W		-	0	-	-	-	0	┼		184
SET CONFIGURATION SCIID CONTROL DEFLECTION NO. N		28%	240		7344	46 345	34.73	348 3		d)	-	-	 	0	4		183
SET CONFIGURATION SCIID. CONTROL DEPLECTION NO.			325									-	 	0	 	VI)73(854)B	182
SET CONFIGURATION	-		324							\			_	10	_	\(\frac{1}{2}\)	181
SET CONFIGURATION CONTROL DEFLECTION OF OF OF OF OF OF OF					343		42	لما		12	<u> </u>	├	 	0	0		149
SET CONFIGURATION SCHID. CONTROL DEFLECTION NO.		264	295		343	-,	54.5			4			 	0		(VI) T3 B5L	148
SET CONFIGURATION CONFIGURATION CONTROL DEPLECTION O1			32/							10		_	┢	0	Z	*	1A7
SET CONFIGURATION SCHIP. CONTROL DEFLECTION NO. NACH NUMBERS IFIER CONFIGURATION α β SA SE SE SE SE SE SE SE SE					340		36			W			 	7			126
SET CONFIGURATION SCIII. CONTROL DEFLECTION of Off O.4 O.6 O.9 O.45 1.05 1.1 1.5 2.2 2.25 4.5 1A2 (ϕ_1) 73 $B4L$ $(B4R)$ A C		293	26,	292	340		336			0		-	 	0	_	7-3	145
SET CONFIGURATION SCHID. CONTROL DEFLECTION OF			7	6						2		-		 		1)73 84	144
SET CONFIGURATION SCHID. CONTROL DEFLECTION OF PARTICULAR OF SCHIDE CONTROL DEFLECTION OF PARTICULAR OF SCHIDE CONFIGURATION OF SCHIDE CONFIGURATION OF SCHIDE CONTROL DEFLECTION OF PARTICULAR OF SCHIDE CONFIGURATION OF		305	304							12				3%	_	73 (846)	1,43
SET CONFIGURATION SCHIP. CONTROL DEFLECTION OF SUNS 0.4 0.6 0.9 0.45 1.05 1.1 1.5 2.2 2.25 4.5			307							2	-		<u> </u>			73 842	RD7 1A2
SET SCHD. CONTROL DEFLECTION NO.		717		<u> </u>		95 1.05	<u> </u>	0	7	RUNS	6		F W	1 :	ρ	CONFIGURATION	DENTIFIER
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	SET
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TABLE 2.

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	67	61	5.5	61	43		37	31		2.5		19	7 13	_·
	SYO	100	486 55		1485	484	6	F	0 0	0	D	0		163
	540	552 545	486 5		1485	484	0	-	0	0	0	F	Ø1) TH B7A1-5	
	53/						\	Ť	0	0	0	M	*	183
	534						`		0	0	0	E		1E2
	536	548 547	462 5		164 0	490	0	 	0 0	0	a	0		EI
	536	548 547	492 50	·	491	490	6		0	0	0	Ž	(\$1) TH	
			487		9488	489	ω	Ĭ	0	0	B	0	~ -	128
			487		484 6	489	W		0	0	0	4	(d1) TH B7-4	
	525	5/5 522	5145		5/3	5/2	0	10	0/0	0	0	4		,DG
	537	551 544	481 53	<u> </u>	1482	483	0	10	0/0	0	D	0		125
	537	55/ 544	181 5		3 482	483	2	3	0 /0	0	0	A		104
<u> </u>	526	516 521	509 57		SOP	5//	6		0	20	0	A		/ D 3
	537	550 543	480 53		KHO	478	6	<u> </u>	0	02.	Ø	0		1,02
	538	550 543	430 53		478 479	478	6	:	0	20	0	7	·	/D/
	527	517 520	504 5		507	506	6		0	0	0	7		109
	539	545 245	475 5			477	0	<u> </u>	00	0	ם	0		108
	539	549 542	475 5		2476	477	0		0	0	0	4	b1) TH B7A1-4	1c.7 (s
	566	558 563	5)				w	<u> </u>	0	0	0	4	Ø141)7185	
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	2:25 4.5	2.2	1.05 1.1 1.5	0.95 1.	0.40	0.4 0.6	of RUNS	2		JA J		α β.	CONFIGURATION	DENTIFIER
		***	MACH NUMBERS	VVM			NO.	DEFLECTION		CONTROL	_	27		TA CET
POSTTEST	D PO		•							¥			g • yk	
PRETEST	☐ PR													

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TABLE 2.

IDPVAR(1) IDPVAR(2) NDV	VAR(1) I	IDP									40000			NTS:	COEFFICIENTS:
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T	568	561	SEC					W		00	0	D	0	<u> </u>	1F1
V	568	561	560	,				ω		0	0	0	7	91 VI) 72A BS	126
-1	525	564	559					W		0	9	D	0	(DIVI) 72 B5	1831
	528							_	Ĭ	0	0	0	4		167
7	530	579	512	797		got :	40	0			0	9	-5 A	\$1)TH B7A1.	RD7 1E6
	2,25 4.5	2,22	1,5	1.05 1.1	0.95	0.40	0.4 0.6	RUNS	2		SAS		ρ	CONFIGURATION	IDENTIFIER
			S	MACH NUMBERS	MAC				DEFLECTION		CONTROL	SCHD. C	SC.		ATA SET

TABLE 2. TEST S-222 DATA SET COLLATION SHEET (CONTINUED)

ÇOEFFICIENTS: a or s SCHEDULES	C.×	-	220	219	218	. 217	216	2/5	214	213	212	2//	210	204	208	207	206	205	204	203	202	RP7201	IDENTIFIER	DATA SET	-		
ES ES	15Y	7																		RD7 1××	DATA SETS	NOTE: SAME	CONFIGURALION	CONETCH		TANKE	
	FA	<u>.</u>																		×	5875	NE AS	CALLON	ATTON		TANK & BOOSTERS @ TANK MRC	
	CAF	19																						ՏՀԴՈՆ.		14	
	CBL	2.5																						CONTROL DI		WK MR	
	W75	31																					RUNS	EFLECTION		()	
	EYN	37																					RUNS	No.			
		43																									
	- - - -	64																						MVCI			
	-	55																						MACH NUMBERS			
, VIII	17	61																									
IDPVAR(1) IDPVAR(2) NDV	MACH 18E	67	-	-	_							,								-					2	- P	
DPVAR(2)	ETAR	3													-										POSTTEST	PRETEST	
NDV	7	75 76	<u></u>	<u> </u>	<u></u>	<u> </u>	<u></u>			L	2	 3	<u></u>	<u></u>		<u></u>	<u></u>	<u></u>	<u> </u>	<u> </u>	<u></u>		<u></u>	<u>L</u>	Н	· J	

TABLE 2.

TEST

___ DATA SET COLLATION SHEET (CONTINUED)

						• • •										es 	a or s SCHEDULES
声	R(1) 1 8 	MACH IDPVAR							EXW	3	CTX	1C87		CAF	CA.	ENTS:	COEFFICIENTS:
67 75 76 ALPHA 75 76	i	61		55		64		43	37		31	5	2.5	19	-	7	
		-	-	-	-	-	-	-			-						320
	-	-	-	-		_	_	-						_			319
	-	-	-	-				-			_						318
		-		-	-												3/7
	-	_		-	-	-	-										3/16
	 .	-	-	-	-			_									315
		-	-	-	-		_							-			314
	-	-		-		-	-	-			_						3/3
		-		-	-								-				3/2
	 	-	-	-	-	_	_	_									311
	-	-		-	-	-	-	-			-			-			3/0
		-		-	-					-	_						309
	-		-	-	-	-	_	-									308
	-			-							-			_			307
			-	-	-						-			-			306
	-	-	-				-				-						305
				-	<u> </u>	_	-	-			-			_			304
	-		-	-	-					Televi	-			_	××	RD71XX	303
		-		-	-	-								_	SETS	DATA	302
															VOTE: SAME AS	NoTE:	RD7301
					_	_				RUN		RUNS		Ω 13	T. A.C.IV	COMI TOOMITTON	IDENTIFIER
				ERS	NUMBERS	млсн				NO.	LECTIO	ROL DEI	CONT	SCHD.		CONETCIBATION	DATA SET
POSTTEST	1 E			ł		ł				, j	,						<u>.</u> .
PRETEST	<u></u>											•	タスク	ž Ž	CRBITER @ TANK MRC	ORBIT	٠

COMPOSITE @ TANK MRC

TABLE 'n TEST 5-222 DATA SET COLLATION SHEET (CONTINUED) PRETEST

CONFIGURATION CONTROL DEFLECTION NO. MACH NUMBERS	COEFFICIENTS: a or ß SCHEDULES	C'N	-	420	419	418	417	416	415	414	4/3	4/2	411	410	409	408	467	406	405	404	403	402	RD7401	LDENTIFIER	DATA SET
SCIID. CONTROL DEPLECTION NO. A5 A5 A5 A5 A6 BCIID. CONTROL DEPLECTION NO. BRUNS RUNS RU	IENTS:																				RD71XX	DATA SE	NOTE: SAM		ı
CONTROL DEFLECTION NO. RUNS RUNS RUNS RUNS RUNS RUNS RUNS RUNS		CA																				775			
DEFLECTION of of RUNS RUNS RUNS ACH NUMBERS RUNS ACH NUMBERS ACH CYM CYM 1 1 1 1 1 1 1 1 1 1 1 1 1		CAF	19																					-	
MACH NUMBERS MACH NUMBERS 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		CBL	2.5																						NTROL DEF
MACH NUMBERS MACH NUMBERS 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		CLM	31																					R	LECTION
MACH NUMBERS 49 55		EYN	37																					UNS	
55		-	43																		, ,				
			64						·																МУСН
		_	55																,						NUMBERS
67 VAR(1) ID		MA	61																						-
	VAR(1) ID	ŀ	67																						

TABLE 2. TEST ______

(2) NDV	IDPVAR(1) IDPVAR(2) NDV)PVAR(.	¥ H															ENTS:	COEFFICIENTS:
1	BETA	MACH	 }	-	-				N,	EYN	FLM	5	CBL.	6	CAF	7	CA	EY	CN
75 76	67		61		55	64		-3		37		31	ľ	2.5		19	13	7	-
	59		56	5/	73			.72	12	6	_	O	O.	0	0	Ā	84	Ø1731	520
-	3.5		39	48						3	()	0	0	0	0	4		-	519
				49			-					0	0	0	0	A	13	\$173	518
	3/		24	28	90			2 91	92	6	7	0	0	0	61	À		4	513
			/3	14	87	-	-	3 82	83	N	(^.	0	0	Ö	0	4	B25	Ø1716	31.5
	32		27	24	89	<u> </u>	Ť	7 88	87	\ \ \	6	O	0	0	0/	4		·	5/5
	23		12	15	86		<u> </u>	1 85	pg.	0		0	0	0	0	7	8:2	\$1.716	514
		424					-				_	10	0	0	D	0		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	53
		423				-			-			0	٥	20	D	0			5/2
		422										0	0	0	Ö	0			5//
		424	187							,,	2	0	0	0	0	A.			510
		423	186			 				17	2	0	0	20	AO	~			509
-			196									0	0	0	A6				305
		422	125							12		0	0	0	0	(s) 4	\$1.7181+Pune (2.5)	Ø17181	507
					80							0	0	c	タイ				506
		42/									_	0	0	Ö	0 2			, 	505
			//	16	·		J	7 78	77	7		0	0	Q	OB	2			504
			197									0	0	0	7 6	A			503
	33		26	25	93		-	64	95	0		0	0	0	46	_			502
	2/	421	11	16	79		├ ──	46. 6	77	7		Ö	-	0	0	4	81	0171	RP7501
	4.5	2.25	2.2	1.5	1.05 1.1	15 1.05	9 0.95	60.0	40	of RUNS Ø.		PERFECTION	D 17	SA S	SCHD. α β	Ω Ω	RATION	CONFIGURATION	DAIA SEI IDENTIFIER
EST	POSTIEST	la l		9	NIMBER	KAC C					NO.		(127			31/6 (8)	COMPOSITE	
-) -)	O PRETEST	_											•	`	1		1		

5-222

<u>ب</u> TEST

TABLE

DATA SET COLLATION SHEET (CONTINUED)

PRETEST

MELICURATION Schi SA SE SR RIMS OH O.6 O.9 C.45 I.25 I.1 I.5 2	NNFIGURATION A	COEFFICIENTS	- - - -		540	539	538	537	536	535	534	533	532	53/	530	529	528	527	526	525	524	523	522	RD7521	IDENTIFIER	DATA SET
SCIII. CONTROL DEFLECTION OF CHAPS OF A SERVING OF A SERVING PRINTS OF A SERVING OF A SERVING PRINTS OF A SERVING OF A SER	SCIII. CONTINUI DEFLECTION of Co.4 0.45 1.05 1.1 1.5 2 1	ENTS:		1	*		\$17181+PLUM			•							7	+	7384	V				173	CONFIGURATION	COMETCHBATTON
CONTROL DEFLECTION of C.4	CONTRIOL DEFLECTION OF OF CAN SEE SE Nums C.Y 0.6 0.9 0.45 1.05 1.1 1.5 2 0 0 0 0 0 0 0.6 1.1 1.5 2 0 0 0 0 0 0 0.0 1.1 1.5 2 0 0 0 0 0 0 0.0 1.2 1.5 3 0.0 1.2 1.5 3 0 0 0 0 0 0 0 0 0.0 1.2 1.5 3<		- - -	19	A	0	(5.1)	0	1	0	Ā	0	A	0	A	0	4	4	4	A	A	6	Ž	0	Ω	SCI
OF CH O.6 0.9 0.45 1.05 1.1 1.5 2 RINNS 0.4 0.6 0.9 0.45 1.05 1.1 1.5 2 6 99 100 100 100 45 45 45 45 45 45 45 45 45 45 45 45 45	of C. H 0.6 0.9 0.45 1.05 1.1 1.5 2. C 71 72 72 73 5.1 5. C 99 100 101 45 45 C 70 64 67 68 53 5 C 70 64 67 75 74 50 5 C 70 67 97 96 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 47 47 47 47 47 47 47 47 47 47 47 47		}		0	D	Ġ	Ď	0	D	0	D	0	Ð	0	D	0	61	0	0	0	\mathcal{Z}	0	$\overline{\mathcal{X}}$		
OF CH O.6 0.9 0.45 1.05 1.1 1.5 2 RINNS 0.4 0.6 0.9 0.45 1.05 1.1 1.5 2 6 99 100 100 100 45 45 45 45 45 45 45 45 45 45 45 45 45	of C. H 0.6 0.9 0.45 1.05 1.1 1.5 2. C 71 72 72 73 5.1 5. C 99 100 101 45 45 C 70 64 67 68 53 5 C 70 64 67 75 74 50 5 C 70 67 97 96 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 47 47 47 47 47 47 47 47 47 47 47 47		Ę	2	20	0	0	0	0	-10	-/0	10	10	20	20	0	0	0	0	Ó	20	0	0	0	SA	LINOC
OF CH O.6 0.9 0.45 1.05 1.1 1.5 2 RINNS 0.4 0.6 0.9 0.45 1.05 1.1 1.5 2 6 99 100 100 100 45 45 45 45 45 45 45 45 45 45 45 45 45	of C. H 0.6 0.9 0.45 1.05 1.1 1.5 2. C 71 72 72 73 5.1 5. C 99 100 101 45 45 C 70 64 67 68 53 5 C 70 64 67 75 74 50 5 C 70 67 97 96 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 47 47 47 47 47 47 47 47 47 47 47 47		İ	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.5	70,
OF CH O.6 0.9 0.45 1.05 1.1 1.5 2 RINNS 0.4 0.6 0.9 0.45 1.05 1.1 1.5 2 6 99 100 100 100 45 45 45 45 45 45 45 45 45 45 45 45 45	of C. H 0.6 0.9 0.45 1.05 1.1 1.5 2. C 71 72 72 73 5.1 5. C 99 100 101 45 45 C 70 64 67 68 53 5 C 70 64 67 75 74 50 5 C 70 67 97 96 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 42 47 47 47 47 47 47 47 47 47 47 47 47 47		-	3	0	0	0	10	10	0	0	0	0	Ö	0	0	0	0	0.	10	0	0	0	٥	SR	EFLECT
S 0.4 0.6 0.9 0.45 1.05 1.1 1.5 2 90 100 100 100 100 100 100 100 100 100 1	\$ 0.4 0.6 0.9 0.95 1.05 1.1 1.5 2 99 100 100 100 45 45 4 99 100 100 45 45 5 90 100 45 45 4 90 100 105 1.1 1.5 2 90 100 105 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.		<u> </u>	-													-									NOT
71 7.6 0.9 0.95 1.05 1.1 1.5 2 71 7.2 7.3 5.1 5.1 79 100 100 100 45 45 4 104 10.3 102 45 4 109 6.7 6.8 5.3 5. 70 64 6.7 6.8 5.3 5. 70 64 7.7 7.2 7.4 5.0 5 102 42 47 4 124 42 42 42 42 42 42 42 42 42 42 42 42 4	71 72 0.45 1.05 1.1 1.5 2 71 72 0.69 0.95 1.05 1.1 1.5 2 72 73 51 52 74 63 102 45 4 74 75 75 74 50 5 76 67 67 68 53 5 76 77 72 75 74 72 74 727 727 728 74 728 729 729 729 729 729 729 729 729 729 729		-	ω	N	12	13	10	12	<i>i</i>	/	/	/	2	10	10	1/3	0	0	1	6	61	0	6	S	n :
0:9 0:45 1:05 1:1 1:5 2 72 73 5:1 5:3 100 101 4: 4 103 102 4:5 4 103 5:2 5 74 5:0 5 77 72 74 74 125 4 127 427 128 4 129 4 129 4 139 4 139 4	0:9 0:45 1:05 1:1 1:5 2 1:00		-	7																					ï	
2.9 0.95 1.0 1.5 2 2.9 0.95 1.0 1.5 2 2.9 1.05 1.1 1.5 2 2.9 1.0 1.5 2 2.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1	2.9 0.95 1.0 1.5 2 2.9 0.95 1.0 1.5 2 2.9 1.05 1.1 1.5 2 2.9 1.0 1.5 2 2.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1		F	1 3														98	76	70	69	104	20	7/		
1.05 1.1 1.5 2 1.05 1.1 1.5 2 1.01 4.6 4 1.02 45 4 1.02 45 4 1.02 45 4 1.03 52 5 1.04 47 4 1.05 47 4	1.05 1.1 1.5 2 1.05 1.1 1.5 2 1.01 42 4 1.02 45 4 1.02 45 4 1.02 45 4 1.02 45 4 1.03 52 5 1.04 42 4 1.05 4 1		-													:		97	75	64	67	103	100		0	
+33 + 43 + 43 + 43 + 43 + 43 + 43 + 43	+33 + 4 + 4 + 4 + 4 + 4 + 5 + 5 + 5 + 5 + 5		-	6 4						. 1								-,					 		0.95	
+33 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5	133 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5																			•					1.05	140
+33 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5	133 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5		-	55															 	G)	653	02	ļ	73		TOEA
1	1		ŀ		433	434	434	429	429	423	428	427	427	426	754	425	425	47	20	50	5/3	45	4.	5/	1.5	
2:25 4:5 35 35 37 37 60 37 60 37	2.25 4.5 36 37 62 5.7 37 37 1	Ļ	-	61	438		437	430	430					432	432	43/	431	40	57	555	57	24	42	56	2.2	
SP 38 60 87 4.5	54.5 4.5 36 62 5.9 5.9 5.9 67	AVVAU	[-		,	-										2,25	
	DUAR	11/17	-	67						·								37	52	62	(3)	36	35	60	5.4	

TABLE

TEST S-22.2

DATA SET COLLATION SHEET (CONTINUED)

PRETEST

ATT I/T VITA	12.5										CARE FOR UNITED
Thouas (1) I Thouas (2) NDV	1770	1		1				-	i i		COEREICIENTS
67	61	55	64	1, 3	37	31		2.5	19	13	7
_		453			_	10	0	0	40		560
		454				0	0	20	0 7		559
_		454			\	0	0	20	40		558
_		554			`	0	0	0	0		557
		455			_	0	0	0	40	\$17386+P2111E (1.5)	1
-	744				_	10	O	0	OD		585
	446					10	C	0	0		554
	449	445			2	10	0	C	0		223
	bht	445			2	10	c.	C	40		552
	447	444			2	0	0	120	0		537
	444 HHY	444			7	C	0	20	40		550
	443 448	443			2	0	0	0	0		549
	444	443			2	0	0	0	0	7386	248 P/
	144 440	1441			12		1	١	00	<u></u>	547
	440	1441			2	1	1		40	T3 85	74.5
	437	442			[7	İ		j	00		545
	434	244			12	1	1	ı	0	7382	445
	436	435			2	10	0	0	Q D	~	543
	436	435			2	10	0	0	A O		542
	438	433			2		-	20	0 D	017181+ PLUME (1.5)	16 M5603
2,25 4.5	2.22	1.1 1.5	.9 0.25 1.05	0.6 0.	RUNS 0,4	Sa	3	SA		CONFIGURATION	LFIER
		MACH NUMBERS	MACH 1		NO.	CONTROL DEFLECTION	OL DE	CONTI	SCHD.		DATA SET

TEST

5-222 DATA SET COLLATION SHEET (CONTINUED)

CONFIGURATION a 8 5A 5E 5g RUINS CH 0.6 050 055 1.05 1.7 1.5 2.1 b 173 BL+PLINE(\$\vert{c}\$3 \to D \to 0 \to 10 \to 10 \to 0 \to 0 \to 0 \to 10 \to	CONFIGURATION CONTROL DEFLECTION MO. CONTROL NUMBERS 453 453 454 455 457 457 457 457	a or b	COEFFICIENTS:			580	579	578	572	24.5	245	574	5.73	572	571	570	569	895	567	566	565	569	563	562	RD7561	IDENTIFIER	DATA SET	-	
SCIII. CONTROL DEFLECTION NO. a k 4A 6E 5R RINKS C+4 C+C C+5 C+25 1.05 1.1 1.5 2.1 b D C C C C C C C+5 C+25 1.05 1.1 1.5 2.1 c D C C C C C C C C+5 C+55 1.05 1.1 1.5 2.1 d D C C C C C C C C+5 C+55 1.05 1.1 1.5 2.1 d D C C C C C C C C+5 C+55 C+55 1.05 1.1 1.5 2.1 d D C C C C C C C C+5 C+55 C+55 1.05 1.1 1.5 d D C C C C C C C C+5 C+55 1.05 1.1 1.5 d D C C C C C C C+5 C+55 C+55 1.05 1.1 1.5 d D C C C C C C+5 C+55 C+55 C+55 d D C C C C C C+5 C+55 C+55 C+55 d D C C C C C C C+5 C+55 C+55 d D C C C C C C+5 C+55 C+55 C+55 d D C C C C C C+5 C+55 C+55 C+55 d D C C C C C C C+55 C+55 C+55 d D C C C C C C C+55 C+55 C+55 d D C C C C C C C+55 C+55 C+55 d D C C C C C C C+55 C+55 C+55 d D C C C C C C C+55 C+55 C+55 d D C C C C C C C C+55 C+55 C+55 d D C C C C C C C C+55 C+55 C+55 d D C C C C C C C C C	SCIII. CONTROL DEFLECTION NO. a b 54 56 58 RUNS C.4 C.6 C.5 C.85 I.05 I.1 I.5 2.1 b D C C C C C C C.5 C.85 I.05 I.1 I.5 2.1 c D C C C C C C C C C		CIENTS:			\$1748741-4+ Pune (2.	~					1		\$17487A1-		7/8	~	7							\$17386+PLUNE(1.				
CONTROL DEFLECTION NO. HACH NUMBERS 54 52 56 RUNS 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	CONTROL DEFLECTION NO. ANCH NUMBERS 54 52 54 52 54 54 54 54			-	19		0	7	0	A	0	_	0	4	0	4	0	4	0	4	0	4	0			ρ	SCI		
DEFLECTION NO. MACH NUMBERS O	DEPLECTION NO. MACH NUMBERS O			}				0	D	0		-	D	0	B	0	D	0	D		Ð	0	D	0	-				
DEFLECTION NO. MACH NUMBERS O	DEPLECTION NO. MACH NUMBERS O			-	2	0	0	0	20	:20	0	0	0	0		1	1	1	0	0	20	20	0	0	0		CONTR		
NO. NO. NACH NIMBERS OF ONE ONE ONE ONE ONE ONE NACH NIMBERS NACH N	NO. NO. NACH NIMBERS OF ONE ONE ONE ONE ONE ONE NACH NIMBERS NACH N	Ì			5	Ó	0	0	0	0	0	0	0	0		1	1	1	0	0	c	0	c	0	L	38			
NO. NO. NACH NIMBERS OF ONE ONE ONE ONE ONE ONE NACH NIMBERS NACH N	MO. MACH NUMBERS of RUNS O. H O. C O. F. D. O. P. S. 1 1 1 1 1 1 1.					0	10	10	0	0	0	0	0	0	J	1	١	l	10	10	0	0	0	0	10	Se	EFLEC		
NO. NO. NACH NIMBERS OF ONE ONE ONE ONE ONE ONE NACH NIMBERS NACH N	NO. NO. NACH NUMBERS OF ONE 1.05 1.1 1.5 2.1 NACH NUMBERS NACH NUMB			F	31																						TION		
MACH NUMBERS C.4 0.6 C.60 0.85 1.05 1.1 1.5 2.1 453 453 454 457 471 470 460 471 470 460 471 470 460 471 470 460 471 599 57 586 587 577 37 1,3 49 55	MACH NUMBERS C.4 0.6 C.60 0.85 1.05 1.1 1.5 2.1 453 453 454 457 471 470 460 471 470 460 471 470 460 471 470 460 471 599 57 586 587 577 37 1,3 49 55					/	^	_	_		\	/	4	1	0	0	N	3		\	_	\	_	_	1	RUNS	NO.		
MACH NUMBERS 0.6 0.95 1.05 1.1 1.5 2.1 0.6 0.95 1.05 1.1 1.5 2.1 45 45 45 45 45 45 45 45 45 45 45 45 45 4	MACH NUMBERS 0.6 0.95 1.05 1.1 1.5 2.1 0.6 0.95 1.05 1.1 1.5 2.1 45 45 45 45 45 45 45 45 45 45 45 45 45 4			-	37									-							-					õ			
MACH NUMBERS C. 90 0.85 1.05 1.1 1.5 2.1	MACH NUMBERS C. 90 0.85 1.05 1.1 1.5 2.1			ŀ				-							47	4.							-			Ö			
MACH NUMBERS 0.95 1.05 1.1 1.5 2.1 9.53 453 453 453 453 453 453 453 453 453 4	MACH NUMBERS 0.95 1.05 1.1 1.5 2.1 9.53 453 453 453 453 453 453 453 453 453 4			-	43			_	_				ij	4	<u> </u>											 			
MCH NUMBERS 1.05 1.1 1.5 2.1 453 453 453 454 457 458 459 451 451 452 451 452 453 453 453 453 453 453 453	MCH NUMBERS 1.05 1.1 1.5 2.1 453 453 453 454 457 458 459 451 451 452 451 452 453 453 453 453 453 453 453							_	_				60	60	70	70										3			
CH NUMBERS (CS) 1/1 1/5 2 453 453 453 454 457 458 458 458 458 458 558 5	CH NUMBERS (ACT INBERS (ACT I	-		-	6 1																					2.25	/k		
55 7 55 45 45 45 45 55 55 55 55 55 55 55 55	55 75 45 45 45 45 45 45 45 45 45 45 45 45 45																									1.05	CH N		
55 55 55 55 55 55 55 55 55 55 55 55 55	55 75 45 45 45 45 45 45 45 45 45 45 45 45 45				5								194	161	460	469										1:1	UMBEI		
V S 5 5 5 5 5 5 5 5 5 6 1 1 1 1 1 1 1 1 1 1	V S S S S S S S S S S S S S S S S S S S				5		25	53	588	588	588	586	591				45	45							450	1.5	SS		
2 2.25 4.5 2 2.25 4.5 2 2.05 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	2 2.25 4.5 2 2.25 4.5 2 2.25 4.5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		V			57	7	1	-	-	V .	0.	257	5.2	24.	241	7 45	7 45	24	5/7	775	45	24	45	~				
100 PAR(1) IDP	EPPOSTT EOS COS COS AR(1) IDPVAR(3)		IDPV	F	61	7		-	-			-	N	1/3	1.	0,	8	7	10.	N.	\ <u>'</u>	7	0,	0.		L			
	POSTT 1.5 OS IDPVAR(AR(1			<u> </u>		ļ	_		-				6	0										_		口	
	STT VAR(3) IDP	-	67	_		_						ļ 	50	50		<u> </u>								15		10×	

TABLE 2. TEST

5-222 _ DATA SET COLLATION SHEET (CONTINUED)

PRETEST

IDPVAR(1) IDPVAR(2) NDV	VID.													ENTS:	COEFFICIENTS:
}	-	<u> </u>	-	-	}	[-	ŀ		F	-	F				-
	61	5	55	64		43	37	w w	31		25		19	7 13	
		582			-				0	Ç	0	0	0	\$11174B7A:-4+PWINE(1.)A	54119
	589	596						2	30	10	0	0	07		599
	589	596					_	10	20	10	0	0	A 0		865
	590	595						2	20	0	0	0	0		7.45
	265	595	-					2	20	0	0	0	A 0		596
	591	594						2	0	10	0	0	0		595
	59/	594						ľV	0	10	0	0	A 0		594
	592	593						2	0	0	0	0	0 D		593
	542	593		-	-	_	_	2	0	0	0	0	40	Ø1V17487A1-4	592
	599		646		644	645 6		4	1	1		1	OD	_	165
	599		646	-	644	645 6		7	ı		1	١	4	TYF187A1-4	590
604	573	600	462		463	HH.		0	1	i	i	(0		589
604	600 573		762		46.3	474		0.	1	1		i	40	TH 87A1-4	885
	570	597						2	0	0	0	0	00		587
	570	597						N	0	0	0	C	40	Ø174F1 B7A1-4	
	27.5								0	10	0	0	0 7	*	585
	576		<u> </u>						C	10	0	0	7		584
	575							\	Q	0	0	20	0		583
	575					-			0	0	0	20	40		582
	577							\	0				0 D	017487A1-4+Puns(2.2)	RD7581
2.25 4.5	2:2	1.5	5 1.1	0.95 1.05	0.4 0.	0.6 6	0.7	RUNS	JRF	JR	36	57	Ωβ	CONFIGURALION	IDENTIFIER
		18	יתיכיו ויסנים העס	157511) h	DEFECTION	DEFLE	TONTROP		SCHD.		DATA SET

5-222

DATA SET COLLATION SHEET (CONTINUED)

PRETEST

SCHEDULES		-]-				583	587	586	585	584	583	582	581		5A8	5A7	546	545	5A4	543	RD75A2	IDENTIFIER	DATA SET	
ES	IENTS:	<u>-</u>	7											ØIVIT4871		_						\$1V1748;	CONFIGURALION	CONFIC	
			13											PIVITYBTALY+PLUME(2.2)		-						RD75A2 \$1V1T4B7A1-4+Pune(1.5) 0	KALLON	DATTON	
		Ļ	19	-			0	À	0	A	0	A	0	2 A		0	4	0	A	0	P	0	ρ	SC	
							A	0	D	0	Ď	0	D	0		Ð	0	\mathcal{I}	0	$ \mathcal{D} $	0	D	≂	SCHD.	
		L	2				0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	SA	CONT	
			2.5				0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	3	ROL D	
		}					10	10	0	0	10	10	0	0		10	10	0	0	10	10	0	df	EFLE	
		-	31				20	20	20	20	0	0	0	0		20	20	20	20	0	0	0	Sec	CONTROL DEFLECTION	
								/	\	_	\	`	_	<u>.</u>	<u> </u>	\	\	_	\	_	_	_	RUNS	NO.	
		-	37					 ×			-									-			0,4		
		ŀ									-								-				10.6		
		-	13	-	-		 			-	_												0		
													-								_		0		
1 1	1	}	64						ļ			<u> </u>			_								0.95 1.05	M M	
		}									 												50	MACH NUMBERS	
		-	55																				1:1	JMBER	
•																485	584	585	585	583	583	542	1.5	S	
	1						 579	579	228	578	580	520	1382	581				-				, ,	2.2		
	IDPV/	ŀ	61	-	<u> </u>		1	10	4	00	0.	0		-	-	-			-				2.25		
	\R(1)	}		-			 _								_				<u> </u>		-		7 5		白
	\IDP\		67	_	-	_	 		_	<u> </u>	-	-	-	-					-		<u> </u>	-	75		POSTTEST
	IDPVAR(1) IDPVAR(2) NDV					_	 			ļ			-												TTI
) NDV		75 76																						ST

TABLE 2. TANK Q TEST TANK MRC

RD76xx

RITTXX ORBITER W ORBITER MRC

5-222

DATA SET COLLATION SHEET (CONTINUED)

PRETEST

BOOSTER @ BOOSTER MRC PITCH FLANE

TABLE 2. TEST PRETEST

IDPVAR(1) IDPVAR(2) NDV	IDPVA	¥									0	16	0	= 30°	7	IENTS: —	COEFFICIENTS:
H. ALPHA	MACH				-	-	+	KX3		K73	2	1682	EAF	, io	EA	EX.	CN
67	61		55		64		43	37		31		25		19	13	7]-
	-																
														-			
											-	 					
	-		-	_													
-		-															
										-							
												 					
9 616	619		6 611	635 636	8	634			Ü	-	-	75	0	W	8127	E	218
18 617	618	0	11 610	632 631	6	633			e		-	75	0	W	B1 D6	3	11.3
1/2	62/		9	630 629	2				W			45	0	¥	102	8	013
4 625	624	ļ							7		-	75	0	N	B172	E	809
620 608	62	ğ	8 609	627 628	6	626			0			75	0	J.	8122	8	808
	623	ω	0 613	641 640	6	642			0			\	0	W	8152	8	807
2 606	622	N	39 612	638 639		637			0			1	0	E	8151	B	806
195	9	183	10	112	1/.3				4				0	À	BY	B	808
168	<u> </u>	/7/	4	118	116				7				0	A	<i>B3</i>	B	804
167	3	173	10	122	/23				4				Ç	7	825	В	803
166	10	172		121	120				N				C	4	2	82	802
169	0	170	V \	116	//7				4		-		0	4	7	B	RD7801
5 4,5	2 2.5	5 2.2	11.5	0.95 1.1	0.9 0.	0.70	0,6	0.4	RUNS	RUNS RUNS		a.f	B	Ω	CONFIGURALION	CONFIC	IDENTIFIER
							-		2						MOTTON	CONTT	

*830-528

TABLE 2. TEST

5-222

DATA SET COLLATION SHEET (CONTINUED)

DATA SET IDENTIFIER RD7841 a or B SCHEDULES COEFFICIENTS: 488 8A3 883 882 SAY 842 885 88 845 CONFIGURATION RDYSBX RD78AX BOOSTER (2) 82 825 B3Œ 48 825 83 **B**2 8 ---ند SCHD. 0 2 19 4 0 <u>4</u> 0 4 ₹ $|\mathcal{P}$ ⋞ Ł 0 0 0 0 0 0 0 CONTROL DEFLECTION NO. of RUNS ١ I 1 25 TANK T3 MRC 1448 TI MRC K 1 X 1 7 1 7 4 37 117 120 2:0 PITCH PLANE 1/3 119 123 122 173 167 PITCH PLANE 13 120 117 119 116 121 172 166 118 171 168 112 188 195 12/ 122 7 112 116 <u>-</u> 3 2.2 4.5 170 169 561 881 170 169 173 172 166 168 167 64 MACH NUMBERS 55 ⇒|idpvar(1)|idpvar(2)|ndv 61 DFOSTTEST PRETEST 67 75 76

AGM [77]	IDPVAR(1) IDPVAK(2) wbv	IDPVAI	•												ES	coefficients; a or 6 schedules
1	BETA	MACH			<u> </u>		KXS	CTW.	5	C82	}	EAF	L	ICA.	757	CX
75 76	67	61	55	64	4 3		37		31	2.5		19		13	7]-
								_	_		-	-				
				195	1837		/ //3	4			1	0		84		985
				168	17/	1118	119	4	_		4	0		83		984
				167	173	_		Į,			1	0		8:5		983
				166	172		120	4.			1	D A		28		982
	-			169	170	116	117	7	-		~	0 A		B/.		981
						-		,								
				195	188	112	////3	7	_		1	0		BY		9A5
				168	17/	├─	119	4			1	2		8.3		944
				167	/73		123	4	_		1	0		825		943
				166	/72) /2/	/ /20	4			1	0		8.2		9/12
				169	170	1//6	/ //7	4			1	04	i	B1		9,41
												-				
				195	157	1/2	//3	4				7		134		308
				168	/7./	118	119	7			1	0 1		B:3		404
				167	173	3 /22	123	4			-	OA	•	B2S	1	903
				166	172	72/	120	7			1	0 4		82	1	902
				169	170	116	117	7				0		B)		RP7 901
				4,5	2.2	1.1	9.0 SN	RUNS			IJ J	Ω 7~		CONFIGURATION	CONI	
		•	NUMBERS	MACH N				ON NO	FLECTI	CONTROL DEFLECTION		SCHD.				DATA SET
EST	□ PRETEST □ POSTTEST			•	PLANE	· ·		S A S S S S S S S S S S S S S S S S S S	-	TANK TI	3 (2) (8)		BOOSTER BOOSTER	RD198X	द द्र द	<u>.</u> . •
		(concluded)	SHEET (NOI	COLLAT	₹ 🖽	A	DATA	1	5-222	1	T.S.	TEST	ω		*830-528

TABLE 3. MODEL COMPONENT DESCRIPTIONS

MODEL COMPONENT: BODY	γ - B1 , β ₂		
GENERAL DESCRIPTION:	040A Orbiter Body		
	B. INCLUDES CAND	PY	
	B2 WITHOUT CAN	OPY	
DRAWING NUMBER:	JLP SDD 9-24-71	• • •	•
P'MENSIONS:		FULL-SCALE	MODEL SCALE
Length, inch	• •	1315.	7.89
Max. Width, inch		204.	1.224
Max. Depth , inc	h	238.	1.427
Fineness Ratio		7.07	7.07
Areas, inch		•	
Max. Cross-	Sectional	306.2 ft ²	1.590 in. ²
Planform		1676. ft ²	8.68 in. ²
Wetted		6530. ft ²	33.8 in. ²
Base		298. ft ²	1.546 in. ²

SENERAL DESCR	IPTION: 040A OF	biter clipped	delta wing	
	· · · · · · · · · · · · · · · · · · ·	· ·	\ <u>\</u>	
			•	
DRAWING NUMBE	R: JI	LP SDD 9-24-7	1	
DIMENSIONS:			FULL-SCALE	MODEL SCALE
TOTAL DA	TA, includes elev	VONS		
Are			3155.3 ft ²	16.37 in. ²
	Planform Wetted	•	5360. ft ²	27.8 in. ²
	wetted in (equivalent), i	inch	882.	5.292
Spa Asn	nect Ratio	raca	1.712	1.712
	e of Taper			
	er Ratio		.1486	.1486
	hedral Angle, deg	rees	7.0	7.0
	idence Angle, deg		1.5	1.5
	odynamic Twist, d		0	0
	-In Angle	3		
	it Angle	• • •	-	
	ep Back Angles, d	lecrees		
	Leading Edge		60.	60.
•	Trailing Edge		0	0
	0.25 Element Line	e e	52.4	52.4
Cho	rds:inch ·	•		
	Root (Wing Sta. 0).0)	_ 89.7	5.38
•	Tip, (equivalent)	(Y = 441)	133.3	.800
•	MAC	,	609.5	3.657
•	Fus. Sta. of .25	MAC	x 1057.5	6.36
·	W.P. of .25 MAC		z 302.3	1.812
	B.L. of .25 MAC	• ••	Y 165.7	.996
' Air	foil Section	•		
	Root		NACA 0008-64	NACA 0008-6
	Tip		NACA 0008-64	NACA 0008-6
EXPOSED	DATA, INCLUDES ET	LEVONS	-	
	•		2010 5.2	: 2 /5 /- 2
Are			2010. ft ²	14.45 in. ²
	n, (equivalent),	inch	678.	4.07
	ect Ratio		1.590	1.590
	per Ratio		1850	1850
Lno	ords, inch		700	
• • • • •	Root (Y102)		720.	<u>4.32</u>
	Tip (Y441)		133.3	
•	MAC .	MAC	494.	2.97
,	Fus. Sta. of .25 W.P. of .25 MAC	rinc .	X <u>1145.5</u> Z <u>308.1</u>	<u>6.87</u> 1.87

MODEL COMPONENT: ELEVONS		
GENERAL DESCRIPTION:		
	<i>\</i>	
	ang di salam pilatan kanadi sang di ngang ping ping ping ping ping ping ping pi	
DRAWING NUMBER: JLP SDD 9-24-71		
DIMENSIONS: (FOR BOTH ELEVONS)	FULL-SCALE	MODEL SCALE
Area	456. ft ²	2.36 in. ²
Span (equivalent), INCH	556.	3.33
Inb'd equivalent chord, INCH	118.	.708
Outb'd equivalent chord, INCH	118.	.708
Ratio movable surface chord/ total surface chord		•
At Inb'd equiv. chord	.1662	.1662
At Outb'd equiv. chord	517	.517
Sweep Back Angles, degrees		
Leading Edge	<u> </u>	Ó
Tailing Edge	0	0
Hingeline	0	0
Area Moment (Normal to hinge line)	2240. ft ³	.835 in.

GENERAL DE	SCRIPTION:	040A Orbi	ter Vert	cal Fin	. Both lea	ding an	d trailing edg
swept.	· .	· .					
	•.					N :	
DRAWING NU	IMBER:	JLР	SDD 9-24	-71		•	
DIMENSIONS	<u>.</u>				FULL-SCA	<u>.£</u>	MODEL SCALE
TOTAL	DATA, INCI	UDES RUDDE	R, EXCLUDE	S TIP PO	סס	•	
	Planform Metted Span (equivaspect Rat	valent) io			342. ft 684. ft 246.2 1.228		1.772 in.2 3.55 in.2 1.480 1.228
	Incidence Aerodynami	o Angle, degr Angle, degr c Twist, de	ees		0 0		-374 0 0
. 4 . •	Leading Trailing 0.25 El	Angles, de Edge g Edge ement Line	grees		45. 15. 40.75		45. 15. 40.75
	Tip, (e MAC	1890Staccoc quivalent)(746.2)		291.6 109.0 214.0		1.750 .654 1.284
	W.P. of B.L. of Airfoil Se	a. of .25 M .25 MAC .25 MAC ction	AL	X 2	604.2		
EXPO:	Root Tip SED DATA				ACA 0012-6	<u>4</u> N	IACA 0012-64
	Area Span, (equ Aspect Rat Taper Rati Chords	io				<u></u>	
Francisco de la composición del composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de la composición de l	W.P. of	a. of .25 M .25 MAC .25 MAC	A	AME AS BOVE			

MODEL COMPONENT: RUDDER- R1		
GENERAL DESCRIPTION:		
	the transferred for the tr	
		A CONTRACTOR OF THE PARTY OF TH
DRAWING NUMBER: JLP SDD 9-24-7	1	
DIMENSIONS:	-FULL-SCALE	MODEL SCALE
Area	135.6 ft ²	.702 in. ²
Span (equivalent), INCH	246.3	1.475
Inb'd equivalent chord, INCH	115.	.690
Outb'd equivalent chord, INCH	43.8	.263
Ratio movable surface chord/ total surface chord		
At Inb'd equiv. chord	.40 •	.40
At Outb'd equiv. chord	40	.40
Sweep Back Angles, degrees	• • • • • • • •	 .
Leading Edge	29.1	29.1
Tailing Edge	15.0	15.0
Hingeline	29.1	29.1
Area Moment (Normal to hinge line)	448. ft ³	.145 in. ³

MODEL COMPONENT: VERTICAL TATL - V2	·		
GENERAL DESCRIPTION: Centerline Stabili	zer		
	•	• .	
			·
			•
DRAWING NUMBER: NR		-	
DIMENSIONS:		FULL-SCALE	MODEL SCALE
TOTAL DATA		•	
Area Planform Wetted Span (equivalent) Aspect Ratio Rate of Taper Taper Ratio Diehedral Angle, degrees Incidence Angle, degrees Aerodynamic Twist, degrees Toe-In Angle Cant Angle Sweep Back Angles, degrees Leading Edge Trailing Edge 0.25 Element Line Chords: Root (Wing Sta. 0.0)	•	45°	45°
Tip, (equivalent) MAC : Fus. Sta. of .25 MAC W.P. of .25 MAC B.L. of .25 MAC Airfoil Section Root Tip EXPOSED DATA		NACA 0012-64 NACA 0012-64	
Area Span, (equivalent) Aspect Ratio Taper Ratio		$ \begin{array}{c} 69,837.3 & 2 \\ \hline 369.17 & in \\ \hline 1,95 & \\ 0.3137 \end{array} $	2.514 in ² 2.215 in 1.95 .3137
Chords Root Tip MAC Fus. Sta. of .25 MAC W.P. of .25 MAC B.L. of .25 MAC		288.0 in 90.35 in 206.38 in 1469.04 652.44	1.728 in 0.542 in 1.238 in 8.814 3.915 0

MODEL COMPONENT: RUDDER R2		n tallagi n Tilan - Allaga (Millian Allaga)
GENERAL DESCRITION:		
DRAWING NUMBER:		
DIMENSIONS:	FULL-SCALE	MODEL SCALE
Area	181 ft ²	939 in ²
Span (equivalent)	346 in	2.073 in
Inb'd equivalent chord	115 in	.691 in
Outb'd equivalent chord	36 in	217 in
Ratio Elevator chord/horizontal tail chord		
At Inb'd equiv. chord	40	40
At Outb'd equiv. chord	40	40
Sweep Back Angles, degrees	•	
Leading Edge	32°	32°
Tailing Edge	21°	21°
Hingeline	32°	32°
Area Moment (Normal to hinge line)	569 ft ³	.212 in ³

MODEL COMPONENT: BODY - ACPS ENGINE POP) . P1	
GENERAL DESCRIPTION: Blunt pod mounted of	on both wing tips.	
	- * 1	!
DRAWING NUMBER: JLP SDD 9-24-7	<u>n</u>	•
DIMENSIONS:	FULL-SCALE	MODEL SCALE
Length , inch	165.	.990
Max. Width, inch	55.	.330
Max. Depth , inch	28.	.168
Fineness Ratio		
Areas, in. ²		•
Max. Cross-Sectional	1540.	.0555
Planform	8280.	.298
Wetted	15,800.	. 568
Base	1540.	.0555

MODEL COMPONENT: BODY -	oms engine	POD , M		
GENERAL DESCRIPTION: P	ods mounted	on both	sides of aft en	d of fuselage.
				•
DRAWING NUMBER:	JLP SDD	9-24 - 71		•
DIMENSIONS:		•	FULL-SCALE	MODEL SCALE
Length, inch			251.	1.509
Max. Width, inch		•	42.8	.257
Max. Depth, inch			59.0	354
Fineness Ratio	•			
Areas, in. ²		•	•	
Max. Cross-Se	ctional	•	1828.	.0658
Planform			9880.	.356
Wetted			25,400.	.915
Base	· •;	•	1807.	.0651

MODEL COMPONENT: BODY - HO Tank - T2		
GENERAL DESCRIPTION:		
Blunt cone-cylinder centerline tank w	with aft boat tail.	
θcone = 10°. Nose radius = 22 in. fu	ill-scale.	
Diameter at base = 274 in. full-scale	•	
DRAWING NUMBER:		•
DIMENSIONS:	FULL-SCALE	MODEL SCALE
Length	_2022_in	<u>12.133 in.</u>
Max. Width Dia. Max. Depth	30 <u>1_in.</u> 301_in.	1.806 in.
Fineness Ratio	6.73	6.73
Area		
Max. Cross-Sectional	494 ft ²	2.562 In. ²
Planform		**************************************
Wetted		
Base	422 ft ²	2.125 in. ²

MODEL COMPONENT: BODY - HO Tank - T1		
GENERAL DESCRIPTION: Blunt cone-cylinder centerline tank with	aft boat tail.	
θ cone = 15°. Nose radius = 22 in. full-s	cale.	
Diameter at base = 274 in. full-scale.		
DRAWING NUMBER:	·	
DIMENSIONS:	FULL-SCALE	MODEL SCALE
Length	1867 in.	11.205 in.
Max. Width	301 in.	1.806 in.
Dia. Max. Depth	301 in.	1.806 in.
Fineness Ratio	6.2	6.2
Area	•	
Max. Cross-Sectional	494 ft ²	2.562 in. ²
Planform		
Wetted		
Base	422 ft ²	2.125 in. ²

MODEL COMPONENT: BODY - HO Tank - T3		
GENERAL DESCRIPTION:		
Blunt cone-cylinder centerline tank with a	ft boat tail.	
θ cone = 10°. Nose radius = 22 in. full-s	cale.	
Diameter at base = 304 in. full-scale.		
	: ,	
DRAWING NUMBER:	<u>-</u> .	•
DIMENSIONS:	FULL-SCALE	MODEL SCALE
Length	_1914 in	11.442 in.
Max. Width Dia.	323.5 in.	<u>l.941_in.</u>
Max. Depth	323.5 in.	1.941 fn.
Fineness Ratio	5.92	5.92
Area		
Max. Cross-Sectional	_587_ft ²	2.959 in. ²
Planform	60 00 10	
Wetted		
Base	518 ft ²	2.613 in. ²

MODEL COMPONENT: BODY - HO-TANK-T4		
GENERAL DESCRIPTION: Blunt Cone-Cyling Ocone = 20°. Nose Radius = 22 In. Full	der Centerline Tank wi	
Full Scale.	Searce maximum bran	iccer - 304 III.
DRAWING NUMBER:		
DIMENSIONS:	FULL-SCALE	MODEL SCALE
Length	1700 In.	10.200 In.
Max. Width Dia.	334 In.	2.004 In.
Max. Depth	<u>334 In.</u>	2.004 In.
Fineness Ratio	5.09	5.09
Area		
Max. Cross-Sectional	608 Ft. ²	3.154 In. ²
Planform		50 to 10
Wetted		
Base	537 Ft. ²	2.785 In. ²

MODEL COMPONENT: TANK VENTRAL FIN, F		
GENERAL DESCRIPTION: Single Fin Mounted	l on Tank, T	
Fin has no movable surface.		
Tim has no morable surface.		
DRAWING NUMBER:	_	
DIMENSIONS:	FULL-SCALE	MODEL SCALE
Area	337 Ft. ²	1.747 In. ²
Span (equivalent)	237 In.	1.420 In.
Inb'd equivalent chord	323 In.	1.940 In.
Outb'd equivalent chord	87 In.	0.520 In.
Ratio Elevator chord/horizontal tail chord		
At Inb'd equiv. chord	up no sis ngagapatan atamban ny arabanany nga	
At Outb'd equiv. chord		
Sweep Back Angles, degrees	•	
Leading Edge	45	45
Tailing Edge	0	0
Hingeline	4 - 4	
Area Moment (Normal to hinge line)		W

MODEL COMPONENT: BODY - Booster, B ₁			
GENERAL DESCRIPTION: Parallel burn version of recoverable pressure-fed booste			
(RPFB). Blunt come-cylinder with afterbody	y flare. θcone - 20°.	θ flare = 15°.	
Nose radius = 22 in. full-scale.	·		
DRAWING NUMBER:	· ·	•	
	· · · · · · · · · · · · · · · · · · ·	,	
DIMENSIONS:	FULL-SCALE	MODEL SCALE	
Length	<u>1799 in.</u>	10.792 in.	
Dia. Body	206 in.	1.236 in.	
Max. Dia. Flare	402 in.	2.412 in.	
Fineness Ratio	8.73	8.73	
Area			
Cross-Sectional (Body)	231 ft ²	1.200 in. ²	
Planform	MD 400 - MD *Make Politics and and the Artificial Annual Anguery		
Wetted	end epo epo Grandino sem para proprio como antico (1884)		
Base (flare)	901 ft ²	4.539 in. ²	

MODEL COMPONENT: EODY - Booster, B S		:
GENERAL DESCRIPTION: Pressure-Fed Booster	r	
		· .
DRAWING NUMBER:	-	
DIMENSIONS:	FULL-SCALE	MODEL SCALE
Length	1799 In.	10.792 In.
Dia. Body	206 In.	1.236 In.
Max. Dia. Flare	624 In.	3.744 In.
Fineness Ratio	8.73	8.73
Area .		•
Max. Cross-Sectional (Body)	_231_Ft ² _	1.200 In. ²
Planform		
Wetted		
Base (Flare)	2125 Ft ²	11.0093 In. ²

MODEL COMPONENT: CODY - Booster, B ₁ S ₂		
GENERAL DESCRIPTION: Pressure-Fed Boost	er ·	
		i
DRAWING NUMBER:		
DIMENSIONS:	FULL-SCALE	MODEL SCALE
Length	1799 In.	10.792 In.
Dia. Body	206 In.	<u>1.236 In.</u>
Max. Dia. Flare	936.3 In.	5.618 In.
Fineness Ratio	8.73	8.73
Area .		
Max. Cross-Sectional (Body)	231 Ft ²	1.200 In. ²
Planform		
Wetted	, en en en en en en en en en en en en en	
Base (Flare)	4785 Ft ²	<u>24.7887 I</u> n. ²

MODEL COMPONENT: BODY - Booste	er - B ₂	
GENERAL DESCRIPTION:		
SRM Booster . Blunt cone-cy	Ninder. θ cone = 20°. Nos	se radius = 15.67 in
full-scale.	Andrew Constitution (Constitution Constitution Constituti	•
DRAWING NUMBER:		
DIMENSIONS:	FULL-SCALE	MODEL SCALE
Length	1 <u>775</u> in.	1 <u>0.633 in.</u>
Max. Width Dia.	156 in.	0.936 in.
Max. Depth	<u>156 in.</u>	0.936 in.
Fineness Ratio	11.37	11.37
Area		
Max. Cross-Sectional	137.8 ft ²	0.694 in. ²
Planform		
Wetted		•••
Base	137.8 ft ²	0.694 in. ²

MODEL COMPONENT: BODY - Booster - B2S		
CENTRAL DESCRIPTION.	•	
GENERAL DESCRIPTION:		
SRM Booster , B ₂ booster with 15° afte	rbody flare. Nose ra	dius = 16.67
in. full-scale.		
DRAWING NUMBER:		
DIMENSIONS:	FULL-SCALE	MODEL SCALE
Length	_1775_in	10.633 in.
Dia. Body	<u>156 in.</u>	<u>0.936 in.</u>
Max. Dia. Flare		1.650 in.
Fineness Ratio	11.37	11.37
Area		
Cross Sectional (Body)	137.8 ft ²	0.694 in. ²
Planform		
Wetted		
Base (Flare)	428 ft ²	2.158 in. ²

MODEL COMPONENT: BODY - Booster - B.	3	
GENERAL DESCRIPTION: Parallel burn version of recoverable pressure-fed booster (RPFB). Blunt cone-cylinder with afterbody flare. P cone = 15°.		
Nose radius - 22 in. full-scale. ΘFlam	re = 15°	
DRAWING NUMBER:	•	
DIMENSIONS:	FULL-SCALE MODEL SCALE	
Length	1800 in. 10.800 in.	
Dia. Body	206 in. 1.236 in.	
Max. Dia. Flare	402 in. 2.412 in.	
Fineness Ratio	8.74 8.74	
Area		
Cross-Sectional (Body)	231 ft ² 1.200 in. ²	
Planform		
Wetted	***	
Base (Flare)	902 ft ² 4.545 in. ²	

MODEL COMPONENT: BODY - Booster - B ₄		
GENERAL DESCRIPTION: Parallel burn version	on of recoverable pr	essure-fed
booster (RPFB). Blunt cone-cylinder wit	th afterbody flare.	0cone = 20°.
0 flare = 5°. Nose radius = 22 in. ful	l scale.	
DRAWING NUMBER:	_	
DIMENSIONS:	FULL-SCALE	MODEL SCALE
Length	1503 in.	9.025 in.
Dia. Body	247 in.	1.483 in.
Max. Dia. Flare	318 in.	1.909 in.
Fineness Ratio	6.09	6.09
Area		
Cross-Sectional (Body)	343 ft ²	1.727 in. ²
Planform		
Wetted		
Base (Flare)	<u>568</u> ft ²	2.865 in. ²

MODEL COMPONENT: Fin, F4		· · · · · · · · · · · · · · · · · · ·
GENERAL DESCRIPTION: Single fin mounted Roll-out angle is 45° down. Fin has no r		flare.
ROTT-OUT angle 15 45 down. Fin has no	invable surface.	
DRAWING NUMBER:	_	
DIMENSIONS:	FULL-SCALE	MODEL SCALE
Area (exposed planform, 1 fin)	503 ft ²	2.610 in ²
Span (equivalent, to booster &)	424 in	2.544 in
Inb'd equivalent chord	410 in	2.460 in
Outb'd equivalent chord	110 in	0.660 in
Ratio Elevator chord/horizontal tail chord		
At Inb'd equiv. chord	***	
At Outb'd equiv. chord		
Sweep Back Angles, degrees		
Leading Edge	45	45
Tailing Edge	0	. 0
Hingeline		e, a s
Area Moment (Normal to hinge line)		

MODEL COMPONENT: CODY - Booster, B ₅		
GENERAL DESCRIPTION: Pressure-Fed Booster	·	i
DRAWING NUMBER:		
DIMENSIONS:	FULL-SCALE	MODEL SCALE
Length	1799 In.	10.792 In.
Dia. Body Max. Dia. Flare	206 In. 319.3 In.	1.236 In. 1.916 In.
Fineness Ratio	8.73	8.73
Area .	· .	•
Max. Cross-Sectional (Body)	231 Ft ²	1.200 In. ²
Planform	# = =	
Wetted	,	***
Base (Flare)	557 Ft ²	_2.88 In. ²

MODEL COMPONENT: BODY - Booster, B6	الكاليات الكاليات الكنسان الماليسين والمراج وواستين والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع	
GENERAL DESCRIPTION: SRM Booster		
	•	
DRAWING NUMBER	· · · · · · · · · · · · · · · · · · ·	
DIMENSION:	FULL SCALE	MODEL SCALE
Length .	1613 in.	9.673 in.
Dia. (Sody)	156 in.	0.936 in
Max Depth	156 in.	0.936 in.
Fineness Ratio	10.35	10_35
Area		
Max Cross-Sectional	137.8 ft ²	0.694 in ²
Planform		<u>'</u>
Wetted		
Base (Nozzle)	95.4 ft ²	0.481_in ²

MODEL COMPONENT: EODY - Booster, B,		
GENERAL DESCRIPTION: 120" Dia. SRM		
DRAWING NUMBER:	·	
DIMENSIONS:	FULL-SCALE	MODEL SCALE
Length	1403 In.	8.418 In.
Dia. Body	120 In.	0.72 In.
Max. Dia. Flare		
Fineness Ratio	11.7	11.7
Area .		•
Max. Cross-Sectional (Body)	79.3 Ft ²	0.408 In. ²
Planform .		
Wetted	• • • • • • • • • • • • • • • • • • •	40 40 40
Base	79.3 Ft ²	0.408 In. ²

TABLE 3. (CONCLUDED)

MODEL COMPONENT: BODY - TVC Tank Al for	r B ₇	
GENERAL DESCRIPTION: Thrust Vectoring I	Fuel Tank	
BENEIONE DESCRIPTION. TIMES VECTOR ING I	uei faik	
1		
DRAWING NUMBER:		. • •
DIMENSIONS:	FULL-SCALE	MODEL SCALE
Length	381.8 In.	2.291 In.
Dia. Body	42 In.	<u>0.252 I</u> n.
Max. Dia. Flare		
Fineness Ratio	9.08	9.08
Area .		. •
Max. Cross-Sectional (Body)	9.65 Ft ²	0.05 In. ²
Planform	. On the said	• • •
Wetted	60 mm cm	***
Base	***	

TABLE 4. Plume Definition

M = 1.5

	<u>B</u> 1	B ₆		0, (3 Eng.	-HiPc)
r _e =	187 in.	r e = 6	6 in.	r _e = 92	.5 in.
x/r _e	r/r _e	x/r _e	r/r _e	x/r _e	r/r _e
0 0.5 1.0 1.5 2.0	1.00 1.17 1.22 1.23 1.20	0 0.5 1.0 1.5 2.0 2.5 3.0	1.00 1.23 1.48 1.70 1.88 2.00 2.11	0 0.5 1.0 1.5 2.0	1.0 1.0 1.0 1.0

M = 2.2

0₁ (3 Eng.-HiPc)

Be	•	0 ₁ (3 Eng	HiPc)
r _e = 6		r _e = 11	8 in.
x/r _e	r/r _e	x/r _e	r/r _e
0	1.00	0	1.00
0.5	1.33	0.5	1.10
1.0	1.62	1.0	1.20
1.5	1.88	1.5	1.26
2.0	2.13	2.0	1.33
2.5 3.0	2.33 2.51	2.5	1.41 1.47
4.0	2.84	3.0 4.0	1.57
5.0	3.12	5.0	1.62
6.0	3.35	6.0	1.65
7.0	3.55	7.0	1.66
8.0	3.72	8.0	1.64
9.0	3.87	;	
10.0	3.97		
11.0	4.03		
12.0	4.11		
13.0	4.15		
34 A	A 17		

TABLE 4, cont.

M = 2.5

$\mathbf{r_e} \stackrel{\mathrm{B_1}}{=}$	187 in.		$\frac{O_1 (4 \text{ Eng.})}{r_e = 8}$	J2S) B9 in.
$\mathrm{x/r_e}$	r/r_e		x/r_e	r/r_e
0 0.5 1.0 1.5 2.0 2.5 3.0 4.0 5.0	1.00 1.34 1.53 1.77 1.91 2.03 2.13 2.30 2.30 2.23		0 0.5 1.0 1.5 2.0 2.5 3.0 4.0 5.0	1.00 1.21 1.34 1.46 1.56 1.61 1.67 1.71
М	= 1.5	<u>B7</u>	M =	2.2
\mathbf{r}_{e}	= 60 in.	•	r _e =	60 in.
x/re	r/r_e	·	x/r_e	r/r_e
0 0.026 0.100 0.240 0.320 0.430 0.680 1.000 1.400 1.870 2.430 3.410 4.150 4.970 5.830	1.00 1.01 1.05 1.10 1.14 1.18 1.27 1.34 1.50 1.61 1.72 1.87 1.94 1.98 2.00		0 0.04 0.17 0.23 0.30 0.38 0.48 0.58 0.70 0.83 1.13 1.30 1.69 2.13 2.64 3.22 3.87 4.58 5.36	1.00 1.02 1.09 1.12 1.16 1.20 1.34 1.40 1.52 1.60 1.73 1.87 2.02 2.17 2.31 2.45 2.57

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Longitudinal Effects of a Bl Booster on (O1)TlBl at Beta = 0	А	Ascent Configuration Booster Isolation	1/1-50
Iongitudinal Effects of a Bl Booster on (01)TIBL at Beta = 6	А	Ascent Configuration Booster Isolation	1/51-80
Lateral-Directional Effects of a Bl Booster on (O1)TlBl at Beta = 0	₩	Ascent Configuration Booster Isolation	1/81-95
Iateral-Directional Effects of a Bl Booster on (Ol)TLBL at Beta = 6	₩	Ascent Configuration Booster Isolation	1/96-104
Iateral-Directional Effects of a Bl Booster on (01)TLB1 with Beta at Alpha = 0	IJ	Ascent Configuration Booster Isolation	1/105-110
Iongitudinal Effects of a Bl Booster on (01)TLB1 with Beta at Alpha = 0	দ্ৰ	Ascent Configuration Booster Isolation	1/111-120
Effect of Beta on Longitudinal Characteristics of OlTLB1	А	Beta	1/121-180
Effect of Beta on Lateral-Directional Characteristics of Olf1Bl	뮹	Beta	1/181-198
<pre>Lateral-Directional Characteristics of Configuration OlTLBL with Beta at Alpha = 0</pre>	a		1/199-218
Aileron Effectiveness of Configuration (01)TlBl at Beta =	O В	Aileron Deflection	1/219-236
Aileron Effectiveness of Configuration OlTLBL at Beta = 0	В	Aileron Deflection	1/237-239
Variation of Aileron Control at Alpha = 0 with Beta of OlfIBl	C	Aileron Deflection	1/240-243
Iongitudinal Effects of a B2 Booster on (01)TLB2 at Beta = 6	А	Ascent Configuration Booster Isolation	1/244-303

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l-Directional Effects of a B2 Booster on l)TIB2 at Beta = 6 t of Beta on Longitudinal Characteristics of OlTIB2 t of Beta on Lateral-Directional Characteristics OlTIB2 t of Beta on Longitudinal Characteristics of OlTIB28 t of Beta on Lateral-Directional Characteristics OlTIB28 tudinal Effects of a B3 Booster on (Ol)TIB3 Beta = 0 Reta = 6	PLOTTED COEFFICIENTS SCHEDULE A A A A	CONDITIONS VARYING Ascent Configuration Booster Isolation Beta Beta Beta Beta Ascent Configuration Ascent Configuration Ascent Configuration Ascent Configuration	VOLUME/ PAGE NO. I/304-309 I/310-369 I/370-387 I/388-447 I/466-525 I/466-525
of a	A	Ascent Configuration Booster Isolation	1/466-525
Longitudinal Effects of a B3 Booster on (01)TlB3 at Beta = 6	А	Ascent Configuration Booster Isolation	1/526-545
Lateral-Directional Effects of a B3 Booster on (O1)TLB3 at Beta = 0	₩	Ascent Configuration Booster Isolation	1/546-557
Lateral-Directional Effects of a B3 Booster on (01)TLB3 at Beta = 6	₩	Ascent Configuration Booster Isolation	1/558-563
Lateral-Directional Effects of a B3 Booster on (O1)TlB3 with Beta at Alpha = 0	Ð	Ascent Configuration Booster Isolation	I/564-569
Longitudinal Effects of a B3 Booster on (O1)T1B3 with Beta at Alpha = O	Ħ	Ascent Configuration Booster Isolation	1/570-579

TABLE 6. (CONTINUED)

TILI	PLOTTED COEFFICIENTS SCHEDULE	CONDITIONS VARYING	VOLUME/ PAGE NO.
Iongitudinal Effects of a B4 Booster on (01)TlB4 at Beta = 0	А	Ascent Configuration Booster Isolation	1/580-639
<pre>Longitudinal Effects of a B4 Booster on (01)TlB4 at Beta = 6</pre>	А	Ascent Configuration Booster Isolation	I/640-659
Lateral-Directional Effects of a B4 Booster on (01)TlB4 at Beta = 0	В	Ascent Configuration Booster Isolation	1/660-674
<pre>Iateral-Directional Effects of a B4 Booster on (01)TlB4 at Beta = 6</pre>	В	Ascent Configuration Booster Isolation	1/675-680
<pre>Iateral-Directional Effects of a B4 Booster on (01)TlB4 with Beta at Alpha = 0</pre>	Ð	Ascent Configuration Booster Isolation	1/681-689
Longitudinal Effects of a B4 Booster on (O1)T1B4 with Beta at Alpha = O	ਦ ੀ :	Ascent Configuration Booster Isolation	1/690-704
Iongitudinal Effects of a B5 Booster on (01)TIB5 at Beta = 6	А	Ascent Configuration Booster Isolation	1/705-724
Lateral-Directional Effects of a B5 Booster on (01)TlB5 at Beta = 6	В	Ascent Configuration Booster Isolation	I/725-730
<pre>Longitudinal Effects of a B5 Booster on (OlV1)TlB5 at Beta = 0</pre>	A	Ascent Configuration Booster Isolation	1/731-790
Longitudinal Effects of a B5 Booster on (OlV1)TlB5 at Beta = 6	А	Ascent Configuration Booster Isolation	1/791-800
Lateral-Directional Effects of a B5 Booster on (OlV1)TLB5 at Beta = 0	뮹	Ascent Configuration Booster Isolation	1/801-812
<pre>Lateral-Directional Effects of a B5 Booster on (OLVI)TLB5 at Beta = 6</pre>	ㅂ	Ascent Configuration Booster Isolation	1/813-815
Lateral-Directional Effects of a B5 Booster on (OlV1)TlB5	D	Ascent Configuration Booster Isolation	1/816-824

TABLE 6. (CONTINUED)

	PLOTTED	CONDITIONS	VOLUME/
TITLE	SCHEDULE	VARYING	PAGE NO.
Iongitudinal Effects of a B5 Booster on (OlV1)TlB5 with Beta at Alpha = 0	H	Ascent Configuration Booster Isolation	1/825-839
Longitudinal Characteristics of (O1)TIB6 at Beta = 0	A	Mach No.	1/840-849
<pre>Iateral-Directional Characteristics of (01)T1B6 at Alpha = 0</pre>	a	Mach No.	I/850-853
Longitudinal Characteristics of (Ol)TLB6 with Ailerons = 20 at Beta = 0	А	Mach No.	1/854-863
<pre>Lateral-Directional Characteristics of (01)TlB6 with Ailerons = 20 at Beta = 0</pre>	ъ	Mach No.	1/864-866
Lateral-Directional Characteristics of (O1)T1B6 with Ailerons = 20 at Alpha = 0	U	Mach No.	1/867-869
<pre>Longitudinal Characteristics of (01)TLB6 with Ailerons = 2 at Alpha = 0</pre>	20 E	Mach No.	1/870-874
Tank Nose Cone Effect on Longitudinal Characteristics of Configuration (O1)TlBl at Beta = 0	А	Configuration	1/875-904
Longitudinal Effects of a Bl Booster on (Ol)T2Bl at Beta = 6	А	Ascent Configuration Booster Isolation	1/905-914
<pre>Lateral-Directional Effects of a Bl Booster on (01)T2Bl at Beta = 6</pre>	· E	Ascent Configuration Booster Isolation	1/915-917
Tank Nose Cone Effect on Longitudinal Characteristics of Configuration (OlV1)TlB5 at Beta = 0	А	Configuration	1/918-947
Tank Nose Cone Effect on Lateral-Directional Characteristics of Configuration (OlVl)T1B5 at Alpha = 0	ics C	Configuration	1/948-959

TABLE 6. (CONTINUED)

<pre>Iateral-Directional Effects of a Bl Booster on (01)T3Bl</pre>	Lateral-Directional Effects of a Bl Booster on (Ol)T3Bl B Ascent Configuration II/73-78 at Beta = 6	Lateral-Directional Effects of a Bl Booster on (01)T3Bl B Ascent Configuration II/61-72 at Beta = 0	Longitudinal Effects of a Bl Booster on (01)T3Bl atAAscent ConfigurationII/41-60Beta = 6Booster Isolation	Longitudinal Effects of a Bl Booster on (Ol)T3Bl at A scent Configuration II/1-40 Beta = 0	Effect of Tank T2 Longitudinal Position on C Configuration I/1075-1082 (O1VI)T2B5 with Beta at Alpha = 0	Effect of Tank T2 Longitudinal Position on (OlV1)T2B5 C Configuration I/1063-1074 with Beta at Alpha = 0	Effect of Tank T2 Longitudinal Position on (OLV1)T2B5 A Configuration I/1033-1062 at Beta = 0	Effect of Tank T2 Longitudinal Position on (OlV1)T2B5 A Configuration I/1003-1032 at Beta = 0	<pre>Lateral-Directional Effects of a Bl Booster on (O1)T2ABl B Ascent Configuration I/1000-1002 at Beta = 6</pre>	Longitudinal Effects of a Bl Booster on (Ol)T2ABl at A scent Configuration I/990=999 Beta = 6	Effect of Tank T2 Longitudinal Position on (01)T2B1 A Configuration I/960-989 at Beta = 0	PLOTTED COEFFICIENTS CONDITIONS VOLUME, TITLE SCHEDULE VARYING PAGE IN
[/79-84	[/73-78	[/61-72	2/41-60	1-40	1075-1082	1063-1074	1033-1062	1003-1032	1000-1002	/990=999	/960-989	VOLUME/ PAGE NO.

TABLE 6. (CONTINUED)

II/253-255	Ascent Configuration Booster Isolation	₩	<pre>Lateral-Directional Effects of a B3 Booster on (01)T3B3 at Beta = 6</pre>
11/241-252	Ascent Configuration Booster Isolatica	В	<pre>Lateral-Directional Effects of a B3 Booster on (01)T3B3 at Beta = 0</pre>
11/231-240	Ascent Configuration Booster Isolation	А	<pre>Longitudinal Effects of a B3 Booster on (01)T3B3 at Beta = 6</pre>
11/191-230	Ascent Configuration Booster Isolation	А	<pre>Longitudinal Effects of a B3 Booster on (01)T3B3 at Beta = 0</pre>
11/188-190	Mach No.	В	<pre>Lateral-Directional Characteristics of Configuration OlT3B2 at Beta = 6</pre>
11/178-187	Mach No.	А	Iongitudinal Characteristics of Configuration OlT3B2 at Beta = 6
11/168-177		А	<pre>Longitudinal Characteristics of Configuration OlT3B2 at Beta = 0</pre>
11/158-167	Ascent Configuration Booster Isolation	Ħ	<pre>Longitudinal Effects of a B2 Booster on (01)T3B2 with Beta at Alpha = 0</pre>
11/152-157	Ascent Configuration Booster Isolation	· a	<pre>Iateral-Directional Effects of a B2 Booster on (01)T3B2 with Beta at Alpha = 0</pre>
11/140-151	Ascent Configuration Booster Isolation	В	<pre>Lateral-Directional Effects of a B2 Booster on (01)T3B2 at Beta = 0</pre>
11/100-139	Ascent Configuration Booster Isolation	А	<pre>Longitudinal Effects of a B2 Booster on (01)T3B2 at Beta = 0</pre>
11/85-99	Ascent Configuration Booster Isolation	Ħ	<pre>Longitudinal Effects of a Bl Booster on (01)T3Bl with Beta at Alpha = 0</pre>
VOLUME PAGE NO.	CONDITIONS VARYING	PLOTTED COEFFICIENTS SCHEDULE	TTTI

TABLE 6. (CONTINUED)

	THE COMMENT		
TITLE	COEFFICIENTS SCHEDULE	CONDITIONS VARYING	VOLUME/ PAGE NO.
<pre>Lateral-Directional Effects of a B3 Booster on (01)T3B3 with Beta at Alpha = 0</pre>	D	Ascent Configuration Booster Isolation	11/256-261
Longitudinal Effects of a B3 Booster on (01)T3B3 with Beta at Alpha = 0	ᅜ	Ascent Configuration Booster Isolation	11/262-271
B3 Boosters Contribution to Longitudinal Characteristics of (O1)T3B3 at Beta = 0	Α	Configuration	11/272-321
B3 Boosters Contribution to Lateral-Directional Characteristics of (O1)T3B3 at Alpha = O	a	Configuration	II/322-333
Effect of Beta on Longitudinal Characteristics of OlT3B4	A	Beta	II/334-394
Effect of Beta on Lateral-Directional Characteristics of OlT3B4	В	Beta	11/394-411
Lateral-Directional Characteristics of OlT3B4 with Beta at Alpha = 0 and 6	a	Alpha	II/412-435
Lateral-Directional Characteristics of Configuration (01)T3B4 with Beta at Alpha = 0	C		11/436-439
Aileron Effectiveness of Configuration OlT3B4 at Beta = O	В	Aileron Deflection	11/440-457
Aileron Effectiveness of Configuration (O1)T3B4 at Beta = 0	В	Aileron Deflection	II/458-460
Effects of Alpha on Rudder Effectiveness of Configuration OlT3B4 at Beta = O	В	Rudder Deflection	11/461-478
Effects of Alpha on Rudder Effectiveness of Configuration (01)T3B4 at Beta = 0	뮹	Rudder Deflection	II/479-481
Effect of Booster Fin F4 on Longitudinal Characteristics of OlT3F4 at Beta = 0	А	Configuration	II/482-541

TABLE 6. (CONTINUED)

Effects of Beta on Lateral-Directional Characteristics B of (01)T4B7A1-4	Effects of Beta on Longitudinal Characteristics of A (O1)T4B7A1-4	<pre>Longitudinal Effects of a B5 Booster on (OlV1)T3B5 with Beta at Alpha = 0</pre>	<pre>Lateral-Directional Effects of a B5 Booster on (OlV1)T3B5</pre>	<pre>Lateral-Directional Effects of a B5 Booster on (OLVI)T3B5 B at Beta = 6</pre>	<pre>Lateral-Directional Effects of a B5 Booster on (OLV1)T3B5 B at Beta = 0</pre>	Longitudinal Effects of a B5 Booster on (OlV1)T3B5 A at Beta = 6	<pre>Longitudinal Effects of a B5 Booster on (OLV1)T3B5</pre>	Effect of Booster Fin F4 on Lateral-Directional Characteristics of (O1)T3B4 at Beta = 6	Effect of Booster Fin F4 on Longitudinal Characteristics A of (01)T3B4 at Beta = 6	Effect of Booster Fin F4 on Longitudinal Characteristics A of (01)T3B4 at Beta = 0	PLOTTED COEFFICIENTS SCHEDULE
Beta	Beta	Ascent Configuration Booster Isolation	Ascent Configuration Booster Isolation	Ascent Configuration Booster Isolation	Ascent Configuration Booster Isolation	Ascent Configuration Booster Isolation	Ascent Configuration Booster Isolation	Configuration	Configuration	Configuration	TED CONDITIONS TENTS CONDITIONS
111/61-78	III/1-60	on II/701-710	on II/695-700	on II/692-694	on II/680-691	on II/670-679	on II/630-669	11/612-629	11/552-611	II/542-551	VOLUME/ PAGE NO.

TABLE 6. (CONTINUED)

TITLE	PLOTTED SCHEDULE	CONDITIONS VARYING	VOLUME/ PAGE NO.
Longitudinal Characteristics of Configuration OlT4B7Al-4 at Beta = O	А	Mach No.	III/79-88
<pre>Lateral-Directional Characteristics of Configuration OlT4B7Al-4 at Alpha = 0</pre>	a	Mach No.	111/89-92
Aileron Effectiveness of Configuration (01)T4B7Al-4 at Beta = 0	В	Aileron Deflection	111/93-110
Aileron Effectiveness of Configuration (01) $\Pi^{4}B7A1-4$ at Beta = 6	ᅜ	Aileron Deflection	111/111-128
Effects of Beta on Aileron Control of Configuration (01)T4B7Al-4 at Alpha = 0	a	Aileron Deflection	111/129-152
Effects of Aileron on Longitudinal Characteristics of Configuration (O1) $T4B7A1-4$ at Beta = 6	А	Aileron Deflection	III/153-212
Effects of Alpha on Rudder Control of Configuration (O1)T4B7Al-4 at Beta = 0	В	Rudder Deflection	III/213-230
Rudder Effectiveness of Configuration (O1)T4B7Al-4 at Alpha = 0	C	Rudder Deflection	III/231-254
Effects of Beta on Lateral-Directional Characteristics of (O1)T4B7A1-4 with Rudder = 10	Я	Beta	III/255-272
Effects of Al on Longitudinal Characteristics of (O1)T 4 B 7 Al- 4 at Beta = O	А	Configuration	111/273-302
Effects of Al on Lateral-Directional Characteristics of (O1)T4B7A1-4 at Alpha = 0	a	Configuration	III/ 3 03-314
Effects of Fin Fl on Longitudinal Characteristics_of Configuration OlT4B7Al-4 at Beta = 0	· A	Configuration	III/315-33 ⁴

TABLE 6. (CONTINUED)

TABLE 6. (CONTINUED)

	IV/106-115	Plume	А	<pre>Longitudinal Effect of Mach No.=1.5 Exhaust Plumes on Configuration OlT3B6 at Beta = 0</pre>
	IV/96-105		А	<pre>Longitudinal Characteristics of Configuration OlTlBl+Plume(2.5) with Deflected Rudder at Beta = 0</pre>
	IV/93-95		В	<pre>Lateral-Directional Characteristics of Configuration OlTlBl + Plume(2.5) with Deflected Rudder at Beta = 0</pre>
	IV/85-92	Plume and Rudder Deflection	a	Effects of M=1.5 Exhaust Plumes on Rudder Effectiveness with Beta at Alpha = 0 of OlTlBl
	IV/79-84	Plume and Rudder Deflection	₩	Variation of Rudder Control at Beta = 0 with Alpha and M=1.5 Exhaust Plumes OlTIB1
78	IV/71-78	Plume and Aileron Deflection	a	Variation of Aileron Control at Alpha = 0 with Beta and M=1.5 Exhaust Plumes OlTlBl
	IV/65-70	Plume and Aileron Deflection	ង	Effects of M=1.5 Exhaust Plumes on Aileron Effectiveness of Configuration OlTLBl at Beta = 0
	IV/62-64	Plume	쓩	Effect of Exhaust Plumes on Aileron Effectiveness of Configuration OlTLB1 on Beta = 0
	IV/54-61	Plume	Ω	Lateral-Directional Effect of M=1.5 Exhaust Plumes on Configuration OlTLB1 at Alpha = 0
	IV/34-53	Plume	А	Longitudinal Effect of M = 1.5 Exhaust Plumes on Configuration OlTlB1 at Beta = 0
	IV/31-33	Plume	ᅜ	Lateral-Directional Effect of Exhaust Plumes on Configuration OlTLB1 at Beta = 6
	VOLUME/ PAGE NO.	CONDITIONS VARYING	PLOTTED COEFFICIENTS SCHEDULE	TTTIE

TABLE 6. (CONTINUED)

TILIL	Longi Co	Later	Later on	Effec of	Effects of C	Varia M=	Varia		M= Varia M=	M=2.2 Variation M=1.9 Effects with	M= Varia M= Effec wi Varia M=	Variation M=2.0 Variation M=1.0 Effects with M=2.0 Effects with
	Longitudinal Ef Configuratic	Lateral-Directional on Configuration	al-Directi Configurat	Effects of M=1.5 of Configurati		iation of Ail: M=1.5 Exhaust	Variation of Ailo M=2.2 Exhaust	cion of Ru L∙5 Exhaus			iation of Rudo M=2.2 Exhaust	ion of Rudde. 2 Exhaust s of M=2.2
	gitudinal Effect of Mach No=2.2 Configuration OlT3B6 at Beta = (onal Effect tion OlT3B6	Lateral-Directional Effect of Mach on Configuration OlT3B6 at Alpha	ects of M=1.5 Exhaust Plumes on of Configuration OlT3B6 at Beta	35	Variation of Aileron Control at M=1.5 Exhaust Plumes OlT3B6	eron Co Plumes	Variation of Rudder Control at M=1.5 Exhaust Plumes OlT3B6	Exhaust Alpha = (der Con Plumes		2 Exhaust I Alpha = 0
	ch No=2.2 t Beta = 0	at of	of Mach at Alpha		olf3B6 at Beta	rol at Alpha 173B6	ntrol at Alpha OlT3B6		Plumes on) of OlT3B6	trol at Beta OlT3B6	of Ol	
	Exhaust	No.=1.5	No=2.2 Ext = 0	Aileron Ei	Aileron	ha = 0 with	ha = 0 with	Beta = 0 with Alpha and	Rudder Eff	= 0 with	Rudder	
	Plumes on	Exhaust Plumes	Exhaust Plumes	Effectiveness	Effectiveness	h Beta and	h Beta and	Alpha and	Rudder Effectiveness	Alpha and	Effectiveness	
PLOTTED COEFFICIENTS SCHEDULE	A	es C	s C	¤ ₩	ზ ₩	C	C	В	Q	₩	a	
SINET.												
CONDITIONS VARYING	Plume	Plume	Plume	Plume and Aileron D	Plume and Aileron D	Plume and Aileron D	Plume and Aileron D	Plume and Rudder De	Plume and Rudder De	Plume and Rudder De	Plume and Rudder De	
ONS	N.			Plume and Aileron Deflection	Plume and Aileron Deflection	Plume and Aileron Deflection	Plume and Aileron Deflection	Plume and Rudder Deflection	Plume and Rudder Deflection	Plume and Rudder Deflection	Plume and Rudder Deflection	
۲V	Ŋ	٦	ħ	۸ī	ΔΙ	VI	VI	VI	, IV	۷ī	۷I	
VOLUME/	IV/116-125	IV /126-129	IV/130-133	17/134-136	IV/137-139	IV/140-143	TV/144-147	IV/148-150	IV/151-15 ⁴	IV/155-157	IV/158-161	``

TABLE 6. (CONTINUED)

ттть	SCHEDULE COEFFICIENTS	CONDITIONS VARYING	VOLUME/ PAGE NO.
Longitudinal Effect of M=2.2 Exhaust Plumes on Configuration OlT4B7Al-4 at Beta = O	А	Plume	IV/172-181
Iateral-Directional Effects of M=1.5 Exhaust Plumes on Configuration OlT4B7Al-4 at Alpha = O	a	Plume	IV/182-185
Lateral-Directional Effects of M=2.2 Exhaust Plumes on Configuration OlT4B7Al-4 at Alpha = O	a	Plume	IV/186-189
Aileron Effectiveness of Configuration OlT4B7Al-4+Plume(1.5) at Beta = 0) в	Aileron Deflection	IV/190-192
Aileron Effectiveness of Configuration OlT4B7Al-4+Plume(2.2) at Beta = 0) в	Aileron Deflection	IV/193-195
Effects of Beta on Aileron Control of Configuration OlT4B7Al-4+Plume(1.5) at Alpha = 0	a	Aileron Deflection	IV/196-199
Effects of Beta on Aileron Control of Configuration OlT4B7Al-4+Plume(2.2) at Alpha = 0	α	Aileron Deflection	IV/200-203
Rudder Effectiveness of Configuration OlT4B7Al-4+Plume(1.5) at Alpha = O	a	Rudder Deflection	IV/204-207
Rudder Effectiveness of Configuration OlT4B7Al-4+Plume(2.2) at Alpha = 0	a	Rudder Deflection	IV/208-211
Effects of Alpha on Rudder Control of Configuration OlT4B7Al-4+Plume(1.5) at Beta = 0	ᅜ	Rudder Deflection	IV/212-214
Effects of Alpha on Rudder Control of Configuration OlT4B7Al-4+Plume(2.2) at Beta = 0	В	Rudder Deflection	IV/215-217

TABLE 6. (CONTINUED)

IV/337-351	Configuration	Ħ	<pre>Longitudinal Characteristics Comparison of VI and V2 on (O1)TI at Alpha = 0</pre>
IV/328-336	Configuration	Ð	Lateral-Directional Characteristics of Vl and V2 on (O1)Tl at Alpha = 0
IV/322-327	Beta	₩	Effects of Beta = 6 on Lateral-Directional Characteristics of Configuration (O1)Tl
IV/302-321	Beta	А	Effects of Beta = 6 on Longitudinal Characteristics of Configuration (O1)TI
IV/282-301	Plume, Rudder Deflection, Rudder Flare	А	Variation of Rudder Control with and without Rudder Flare and M=2.2 Exhaust Plume
IV/262-281	Plume, Rudder Deflection, Rudder Flare	А	Variation of Rudder Control with and Without Rudder Flare and M=1.5 Exhaust Plume
IV/254-261	Plume,Rudder Deflection, Rudder Flare	a	Effects of M=2.2 Exhaust Plumes on Rudder Effectiveness with and without Rudder Flare
IV/246-253	Plume,Rudder Deflection, Rudder Flare	Ω	Effects of M=1.5 Exhaust Plumes on Rudder Effectiveness with and without Rudder Flare
IV/242-245	Plume	Ö.	<pre>Lateral-Directional Effects of M=2.2 Exhaust Plumes on Configuration OlVlT4B7Al-4 at Alpha = 0</pre>
IV/232-241	Plume	А	Iongitudinal Effects of M=2.2 Exhaust Plumes on Configuration OlVIT4B7Al-4 at Beta = 0
IV/228-231	Plume	a	Lateral-Directional Effects of M=1.5 Exhaust Plumes on Configuration OlVlT4B7Al-4 at Alpha = 0
IV/218-227	Plume	A	Longitudinal Effects of M=1.5 Exhaust Plumes on Configuration OlVlT4B7Al-4 at Beta = 0
VOLUME/ PAGE NO.	CONDITIONS VARYING	PLOTTED COEFFICIENTS SCHEDULE	С

TABLE 6. (CONTINUED)

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- , - 	IV/450-452	Configuration	뀽	Lateral-Directional Characteristics of Various Boosters on Configuration (O1)T2 at Beta = 6
	644-044/AI	Configuration	А	Longitudinal Characteristics of Various Boosters on Configuration (O1)T2 at Beta = 6
	IV/432-439	Configuration	a	Effect of Tank T2 Longitudinal Position on (01)T2 with Beta at Alpha = 0
	1V/412-431	Configuration	А	Effect of Tank T2 Longitudinal Position on (01)T2 at Beta=0
	17/403-411	Rudder Deflection	В	Effects of Alpha on Rudder Effectiveness of Configuration (O1V1)T1 at Beta = 0
	IV/391-402	Rudder Deflection	С	Rudder Effectiveness of Configuration (OlV1)T1 at Alpha = 0
1	<u>ī</u> v/386-390	Mach No.	년	<pre>Longitudinal Characteristics of (OLVI)TI with Ailerons=20 at Alpha = 0</pre>
	IV/383-385	Mach No.	IJ	<pre>Lateral-Directional Characteristics of (OlVI)T1 with Ailerons = 20 at Alpha = 0</pre>
· · · · · · · · · · · · · · · · · · ·	IV/380-382	Mach No.	ᅜ	<pre>Lateral-Directional Characteristics of (OlV1)T1 with Ailerons = 20 at Beta = 0</pre>
	IV/370-379	Mach No.	A	<pre>Longitudinal Characteristics of (OLVI)TI with Ailerons=20 at Beta = 0</pre>
 -	IV/361-369	Aileron Deflection	D	Effects of Beta on Alleron Effectiveness of Configuration (OLVI)TI at Alpha = 0
,	IV/352-360	Aileron Deflection	₩	Aileron Effectiveness of Configuration (OlV1)T1 at Beta = 0
 	VOLUME/ PAGE NO.	CONDITIONS VARYING	PLOTTED COEFFICIENTS SCHEDULE	CC

TABLE 6. (CONTINUED)

	IV/ 544-547	Mach No.	α	Lateral-Directional Characteristics of Configuration T3B5 at Alpha = 0
	IV /534-543	Mach No.	А	<pre>Longitudinal Characteristics of Configuration T3B5 at Beta = 0</pre>
	IV /530-533	Mach No.	Ω	Lateral-Directional Characteristics of Configuration T3B2 at Alpha = O
	IV/520-529	Mach No.	А	Longitudinal Characteristics of Configuration T3B2 at Beta = 0
	IA/216-219	Mach No.	Q	Lateral-Directional Characteristics of Configuration TLB6 at Alpha = 0
8	IV/506-515	Mach No.	А	Longitudinal Characteristics of Configuration TLB6 at Beta = 0
3	IV/502-505	Mach No.	a	Lateral-Directional Characteristics of Configuration TLB5 at Alpha = 0
•	IV/492-501	Mach No.	Α	<pre>Longitudinal Characteristics of Configuration TLB5 at Beta = 0</pre>
	IV/489-491	Beta	В	Effects of Beta on Lateral-Directional Characteristics of (O1)T4
	IV/479-488	Beta	А	Effects of Beta on Longitudinal Characteristics of (O1)T4
	IV/473-478	Beta	쓤	Effects of Beta = 6 on Lateral-Directional Characteristics of Configuration (O1)T3
	IV/453-472	Beta	А	Effects of Beta = 6 on Longitudinal Characteristics of Configuration (O1)T3
	VOLUME/ PAGE NO.	CONDITIONS VARYING	PLOTTED COEFFICIENTS SCHEDULE	TITI

TABLE 6. (CONTINUED)

V/262-301	Configuration	А	<pre>Longitudinal Characteristics of Various Boosters Alone at Beta = O and Nominal MRC</pre>
v/202-261	Configuration	А	Longitudinal Characteristics of Various Tanks at Beta = 0
V/187-201	Beta	В	Effects of Beta on Lateral-Directional Characteristics of OlCl
v/172-186	Beta	Ж	Effects of Beta on Lateral-Directional Characteristics of OlCl
۷/163-171	Beta	В	Effects of Beta on Lateral-Directional Characteristics of Ol V Off
V/133-162	Beta	А	Effects of Beta on Longitudinal Characteristics V Off
v/124-132	Beta	ж	Effects of Beta on Lateral-Directional Characteristics of OlVI
v/94-123	Beta	А	Effects of Beta on Longitudinal Characteristics of OlVI
v/91-93	Rudder Deflection	ᅜ	Effects of Alpha on Rudder Effectiveness of Configuration OlV1
v/79-90	Rudder Deflection	₩	Effects of Alpha on Rudder Effectiveness of Configuration Ol at Beta = O
v/61-78	Beta	뮹	Effects of Beta on Lateral-Directional Characteristics of Ol
V/1-60	Beta	Α	Effects of Beta on Longitudinal Characteristics of Ol
VOLUME/ PAGE NO.	CONDITIONS VARYING	PLOTTED COEFFICIENTS SCHEDULE	TITIE

TABLE 6. (CONTINUED)

TTTE	PLOTTED COEFFICIENTS SCHEDULE	CONDITIONS VARYING	VOLUME/ PAGE NO.
Longitudinal Characteristics of Various Boosters Alone at Beta = 0 and Tank 1 MRC	А	Configuration	V/302-341
Longitudinal Characteristics of Various Boosters Alone at Beta = 0 and Tank 3 MRC	A	Configuration	v/342-381
Lateral-Directional Characteristics of Various Boosters Alone at Beta = 0 and Tank 1 MRC	₩	Configuration	v/382-393
Lateral-Directional Characteristics of Various Boosters Alone at Beta = 0 and Tank 3 MRC	₩	Configuration	v/394-405
Lateral-Directional Characteristics of Various Boosters Alone at Alpha = O and Nominal MRC	. a	Configuration	V/406-421
Lateral-Directional Characteristics of Various Boosters Alone at Alpha = 0 and Tank 1 MRC	a	Configuration	V/422-437
Lateral-Directional Characteristics of Various Boosters Alone at Alpha = 0 and Tank 3 MRC	a	Configuration	v/438-453
Comparison of Longitudinal Characteristics of Booster Bl with Larger Aft Flares S	А	Configuration	V/ 454-523
Comparison of Longitudinal Characteristics of Booster Bl with Flaps D2 at Various Deflection	А	Flap Deflection	v/524-583
Comparison of Longitudinal Characteristics of Booster Bl with Various Flaps	А	Flap Deflection	v/584-643

TABLE 6. (CONCLUDED)

PLOTTED COEFFICIENTS SCHEDULE:

- (A) CN, CA, CAF, CLM, CL & CDF vs. ALPHA

 CN & CL vs. CLM, CL & CLSQR vs. CDF
- (B) CY, CYN & CBL vs. ALPHA
- (C) CY, CYN, CBL & CAF vs. BETA
- (D) CY, CYN, CBL vs. BETA
- (E) CN, CAF, CLM, CL & CDF vs. BETA

Notes:

- Positive directions of force coefficients moment coefficients, and angles are indicated by arrows.
- For clarity, origins of wind and stability axes have been displaced from the center of gravity.

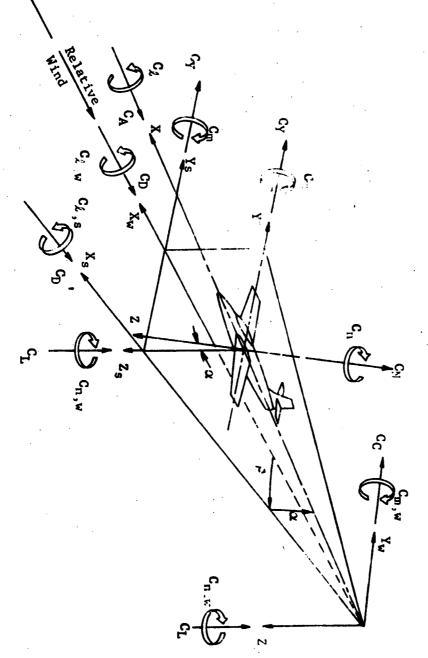
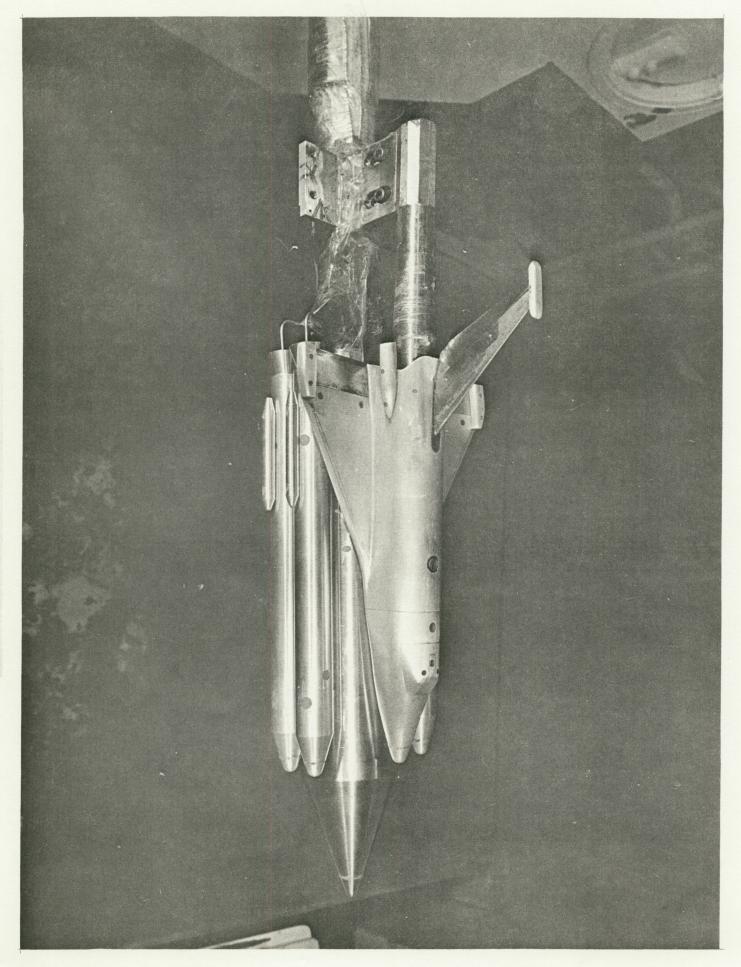
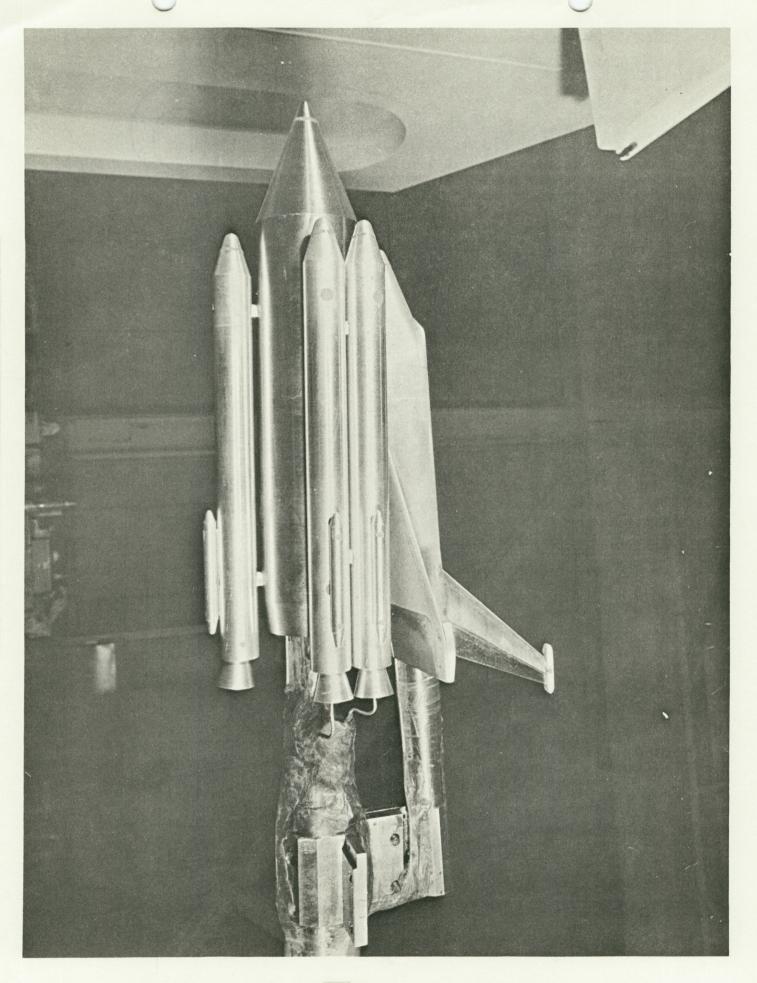


Figure Axis systems, showing direction and sense of force and moment coefficients, angle of attack, and sideslip angle

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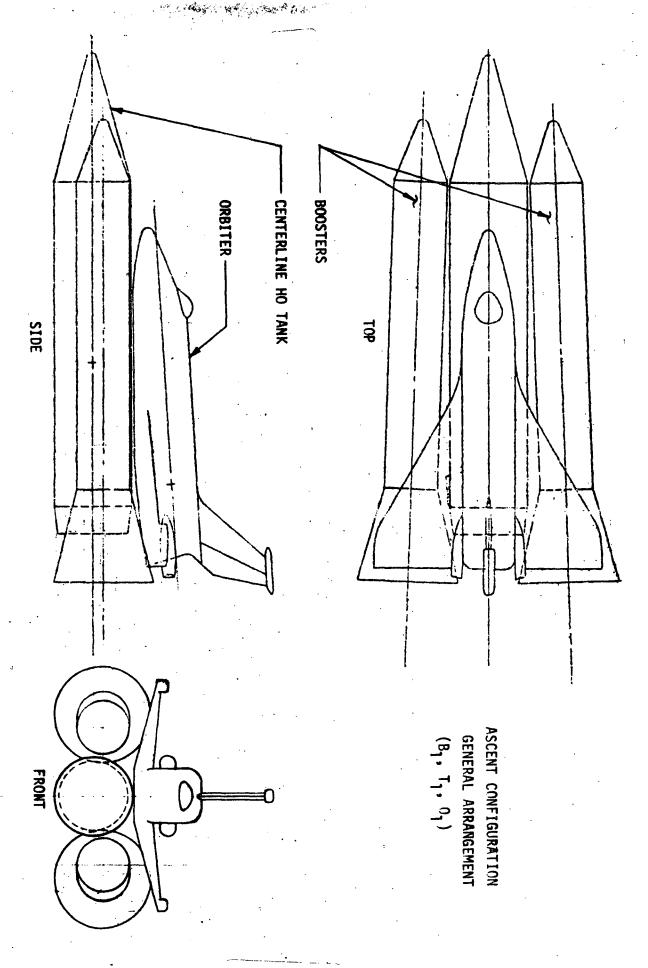
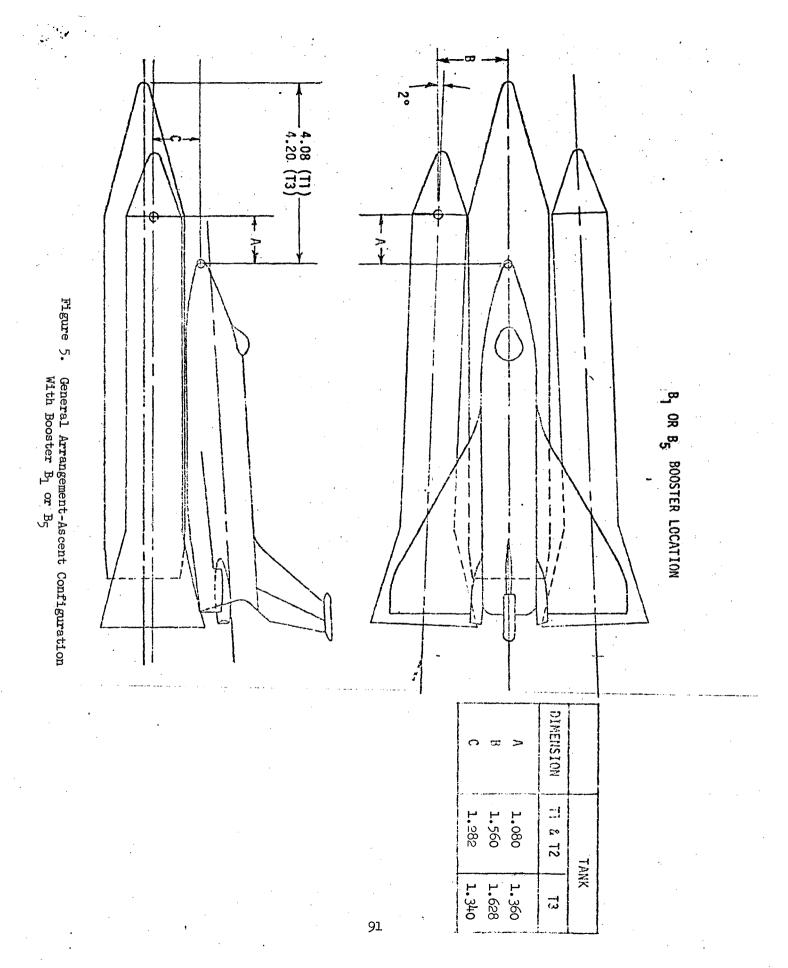
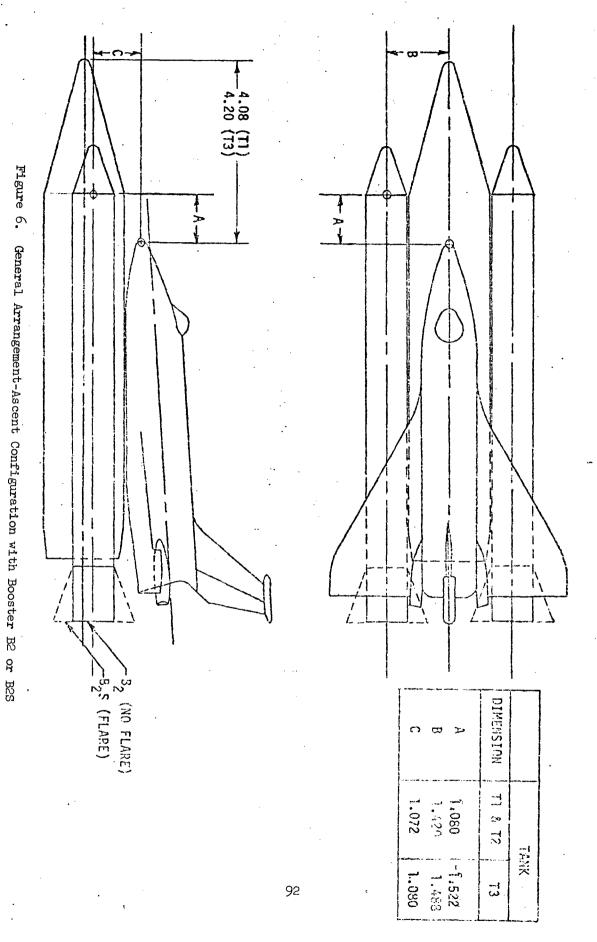


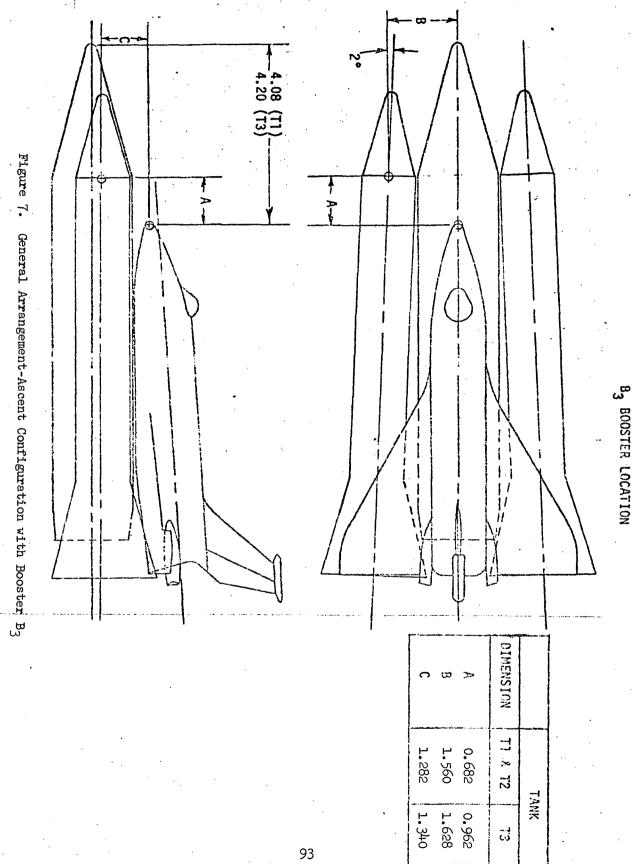
Figure 4. General Arrangement-Ascent Configuration $O_1 T_1 B_1$

90









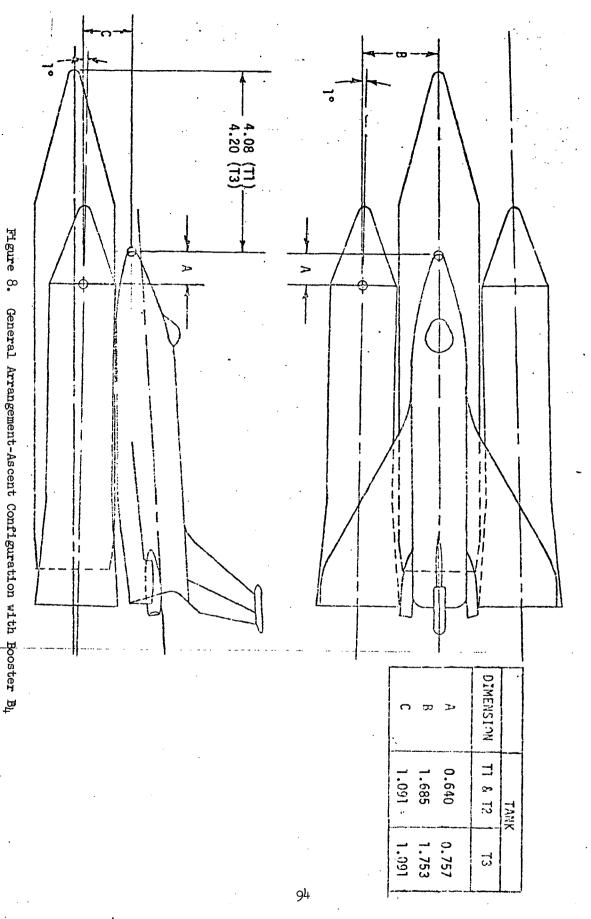
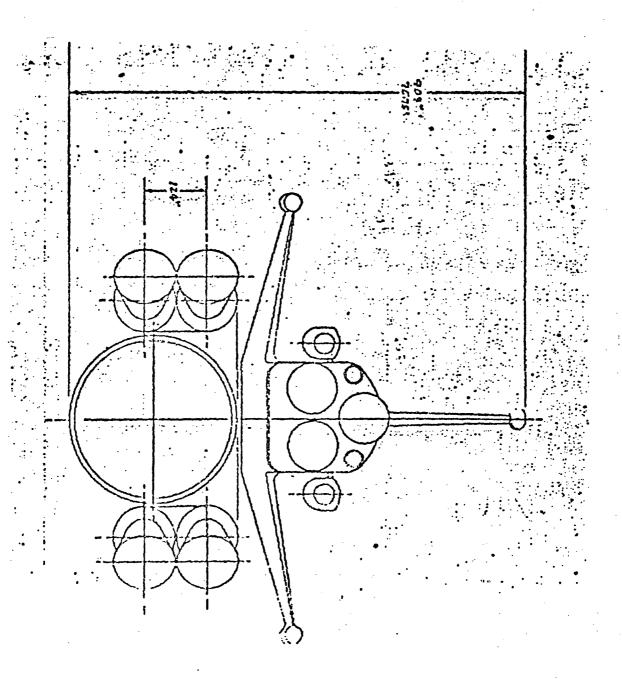


Figure 9. General Arrangement-Ascent Configuration

Figure 10. General Arrangement-Ascent Configuration OlT4B7-4 (Top View)



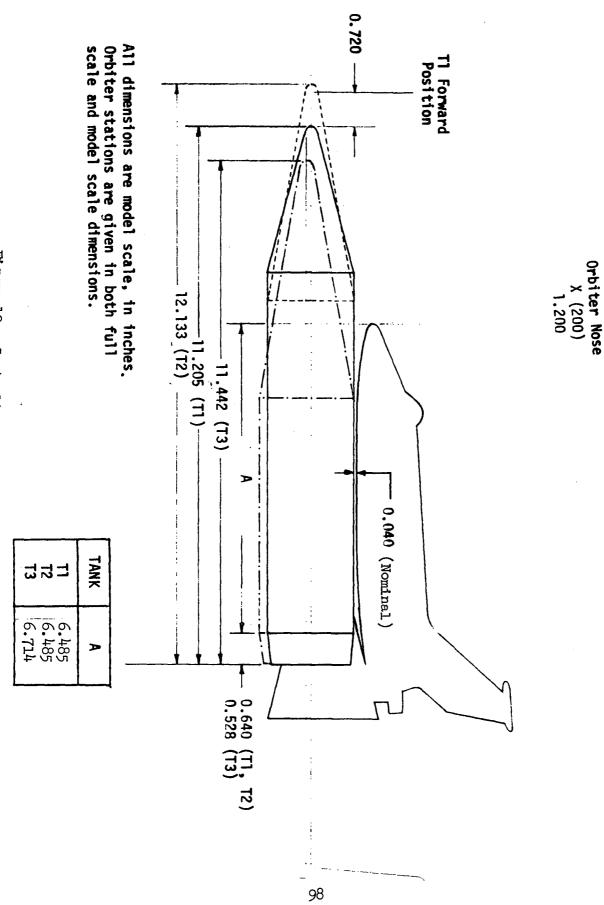


Figure 12. Centerline HO Tank Locations

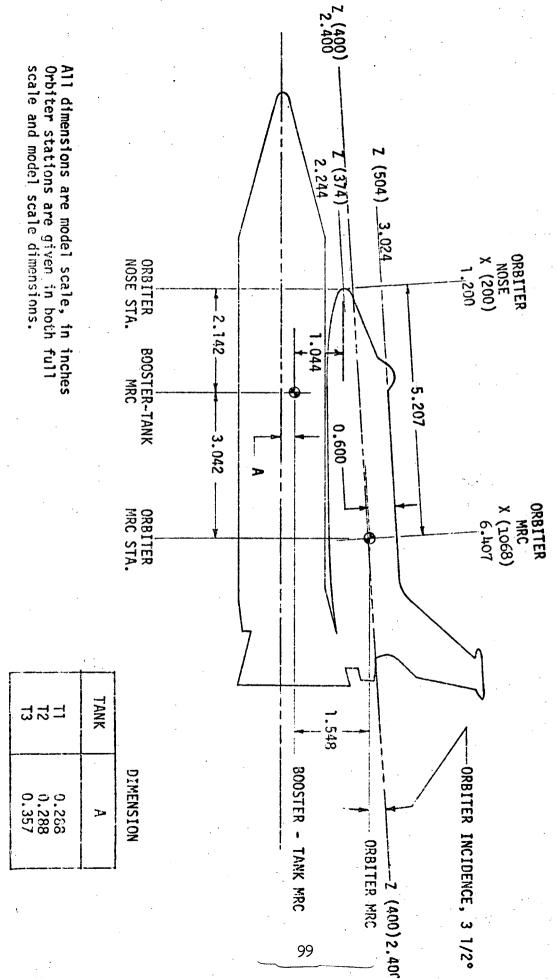
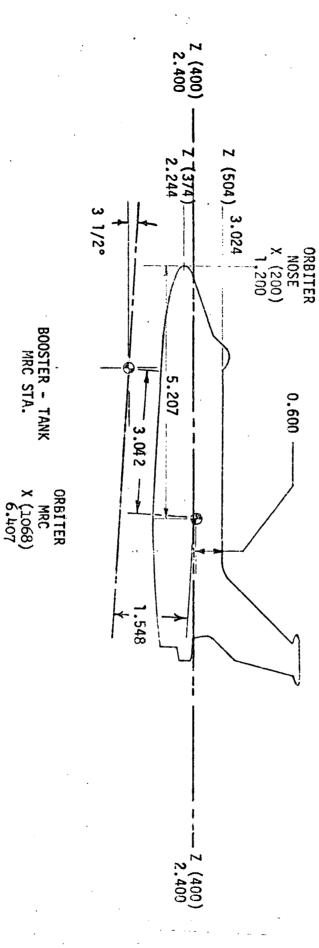


Figure 13. Moment Transfer Diagram for Ascent Configuration

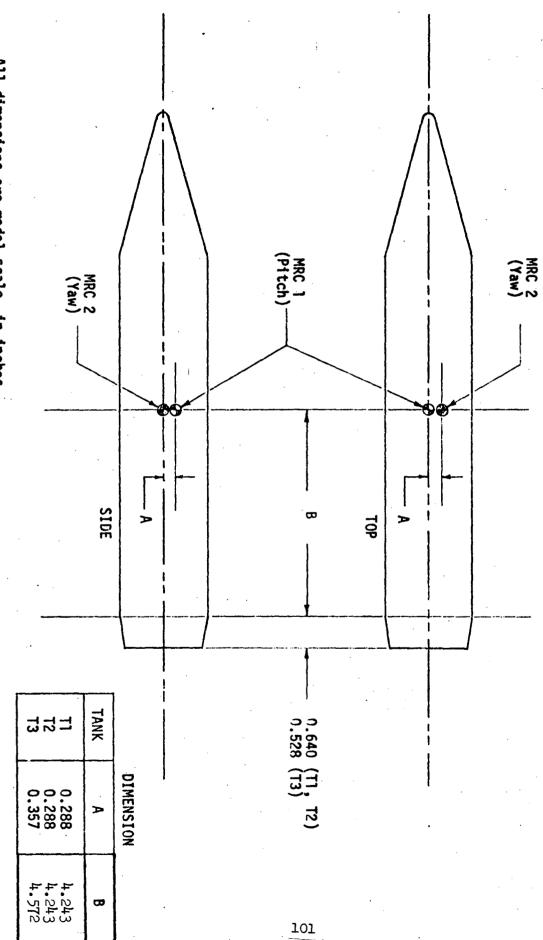
MOMENT TRANSFER DIAGRAM ORBITER ALONE



All dimensions are model scale, in inches Orbiter stations are given in both full scale and model scale dimensions.

Figure 14. Moment Transfer Diagram for Orbiter Alone

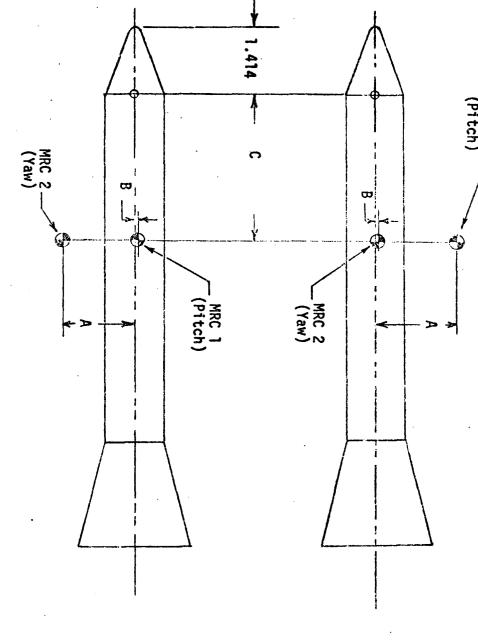
MOMENT TRANSFER DIAGRAM CENTERLINE TANK ALONE



All dimensions are model scale, in inches

Figure 15. Moment Transfer Diagram for Centerline Tank Alone

MOMENT TRANSFER DIAGRAM B₁ Booster Alone



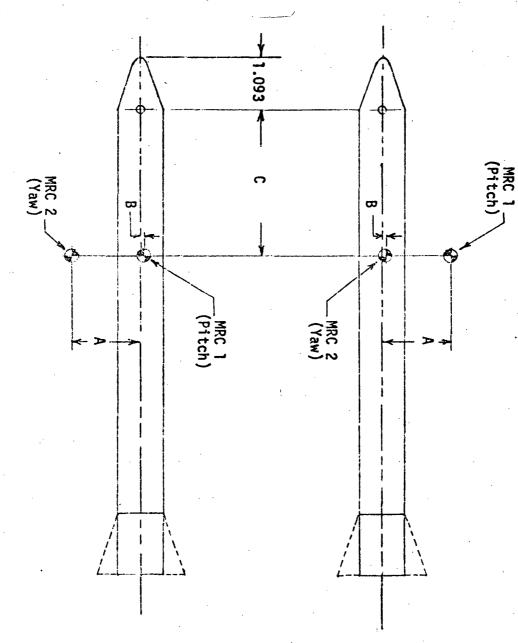
		Dimension	
TANK	230	В	0
	1.664	0.238	3.222
T ₂	1.564	0.238	3.222
υŢ	1.732	0.297	3.502

Booster Alone

X = 4.386" From nose

H

MOMENT TRANSFER DIAGRAM B₂ and B₂S Boosters Alone

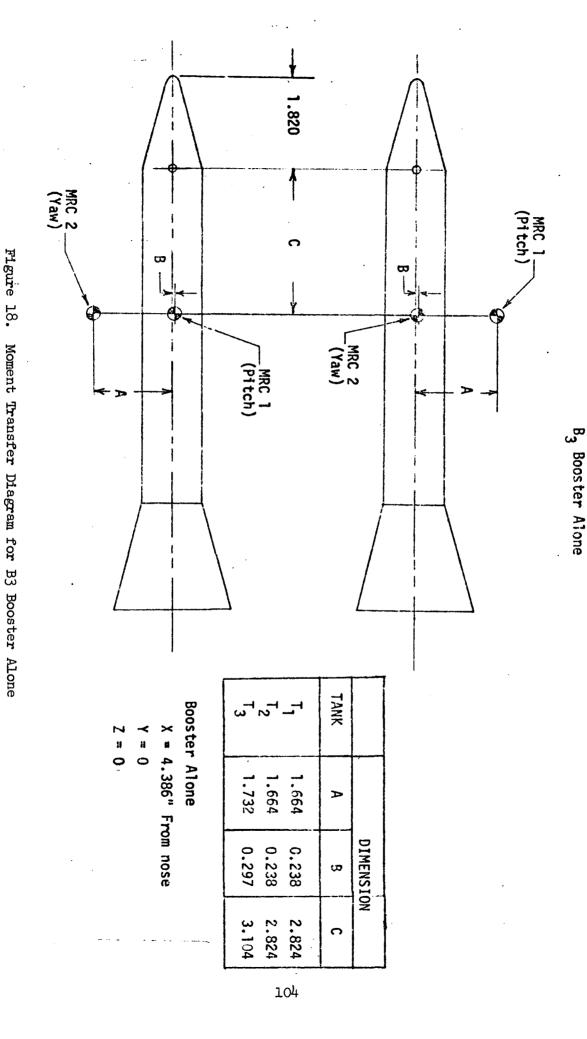


			ω
3 664	0 037	1 489	⊣,
3.222	0.058	1.420	√ ¹
3.222	0.058	1.420	_;-1
C	В	A	TANK
	DIMENSION	DII	

Booster Alone

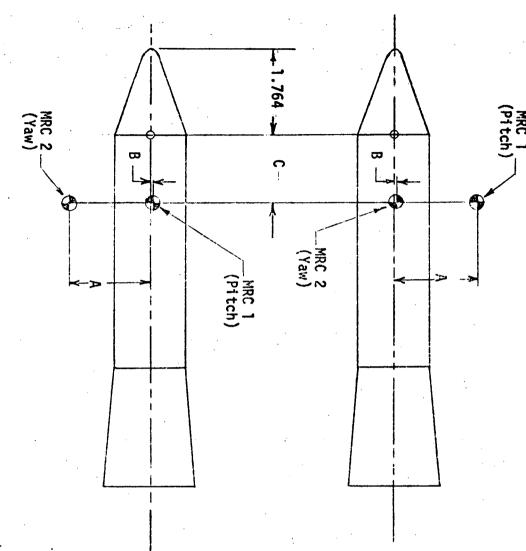
X = 4.091" From nose

Y = 0



MOMENT TRANSFER DIAGRAM

MOMENT TRANSFER DIAGRAM B₄ Booster Alone



		DIMENSION	
TANK	А	В	С
 	1.709	0.047	1.502
~	1.709	0.047	1.502
ຜ	1.774	0.047	1.385

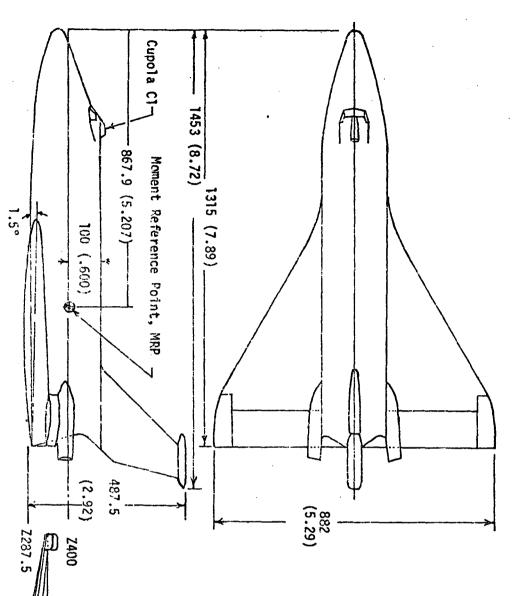
Booster Alone

X = 3.152" From nose

-

0 11

Figure 19. Moment Transfer Diagram for B4 Booster Alone



Notes:

- All dimensions are in inches
- Model values are shown in parentheses.

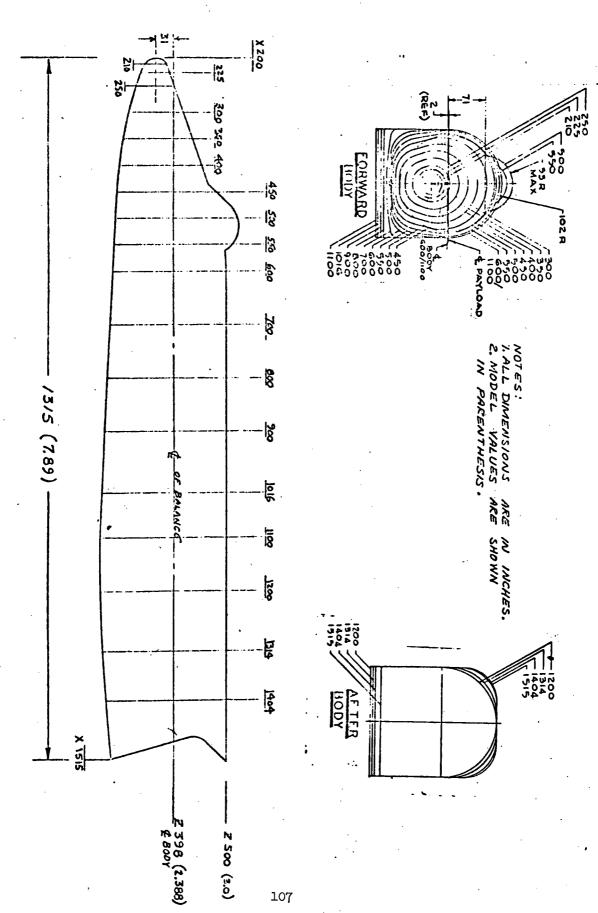
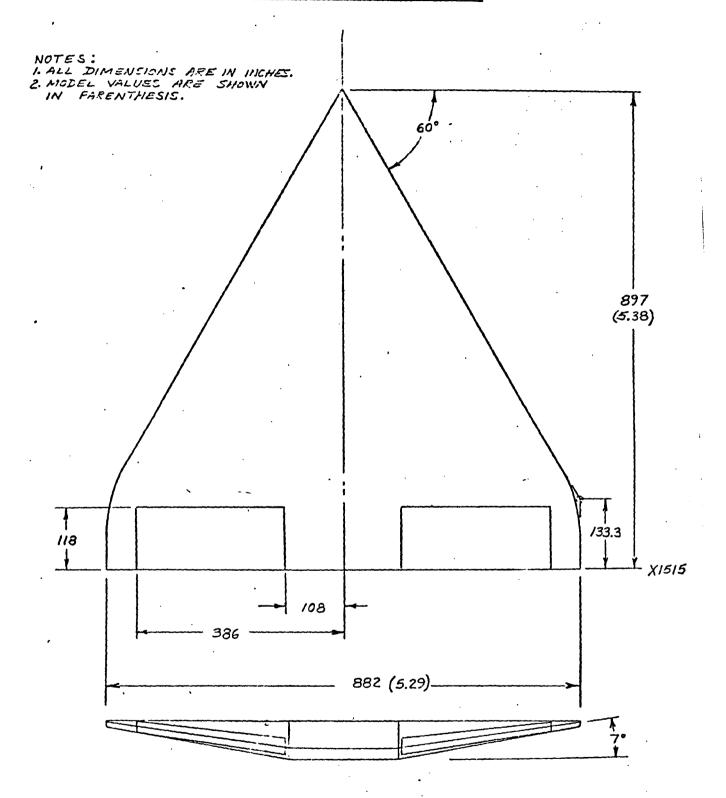
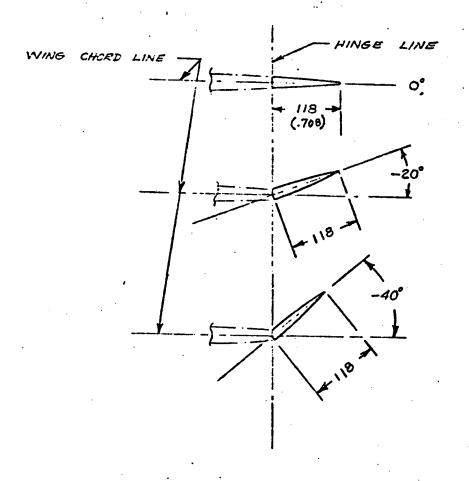


Figure 21. Orbiter Body, B₁

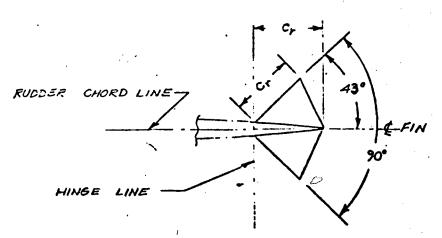


.. Figure 22. Wing and Elevon, W_1

ELEVON DEFLECTIONS



RUDDER FLARE AT A TYPICAL SECTION



NOTES:
I. DIMENSIONS ARE IN INCHES
Z. Cr IS RUDDER LOCAL
CHORD.
3. MODEL VALUES SHOWN IN PROSPERTIES.

Note: Additional rudder flare angle of ±17.5° was tested at 1% = .6,.9,1.2 for lateral-directional data

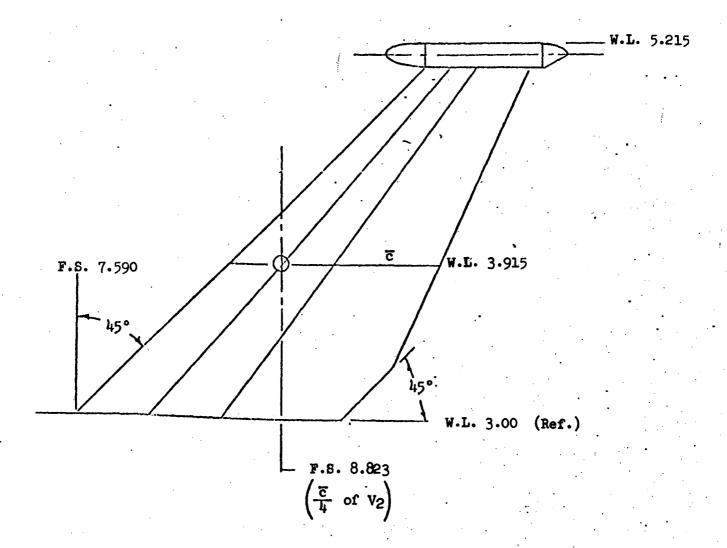
Figure 23. Elevon Deflections and Rudder Flare

NOTES: I. ALL DIMENSIONS ARE IN INCHES. 2. MODEL VALUES ARE SHOWN IN PARENTHESIS. X 1265 - 288 (1.727) -- 115 8 - 65,9--X1553 109.7------- 183 (1038) ----43.8 270 (1.620) 40.5 X500 110

Figure 24. Vertical Fin and Rudder, V_1

Vo - LARGER AREA CENTERLINE VERTICAL TAIL AND RUDDER

$$S_V = 2.514 \text{ in}^2$$
 $C_R = 1.728 \text{ in}$
 $C_T = 0.542 \text{ in}$
 $C_T = 0.542 \text{ in}$
 $C_T = 0.310$
 $C_T = 0.310$
 $C_T = 0.310$

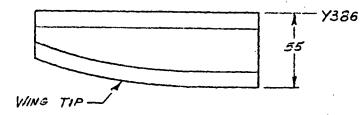


Note: All dimensions are model scale in inches.

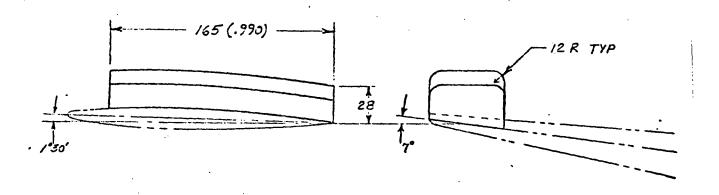
Figure 25. Vertical Fin and Rudder, V_2

MCDONNELL DOUGLAS CORPORATION

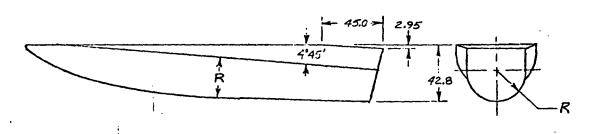
ACPS ENGINE POD ~ PI

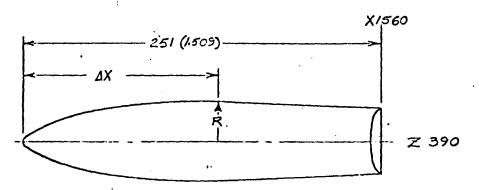


NOTES:
I.ALL DIMENSIONS ARE IN
INCHES.
2. MODEL VALUES ARE SHOWN
IN PARENTHESIS.



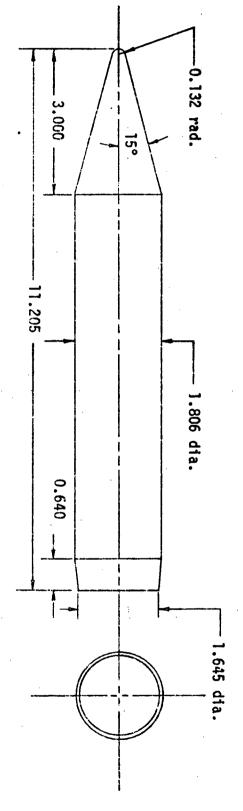
OMS ENGINE FOD ~ MI





0 25.0 58.3 75.0 /00.0 /33.0 245.0	0 15.7 28.5 29.5 29.0

Figure 26. ACPS Engine Pod, Pl and OMS Engine Pod, Ml



All dimensions are model scale, in inches.



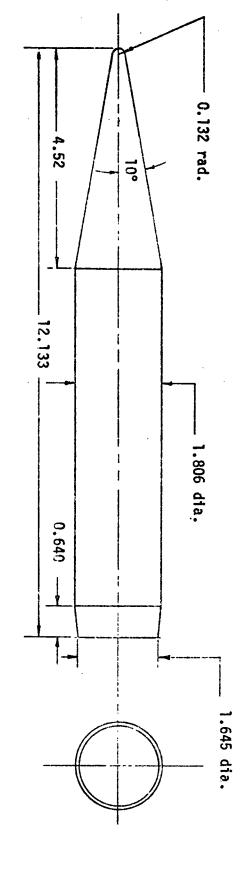


Figure 28. Centerline HO Tank, T2

All dimensions are model scale, in inches.



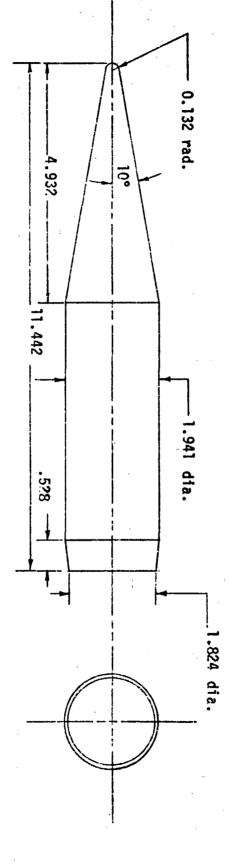
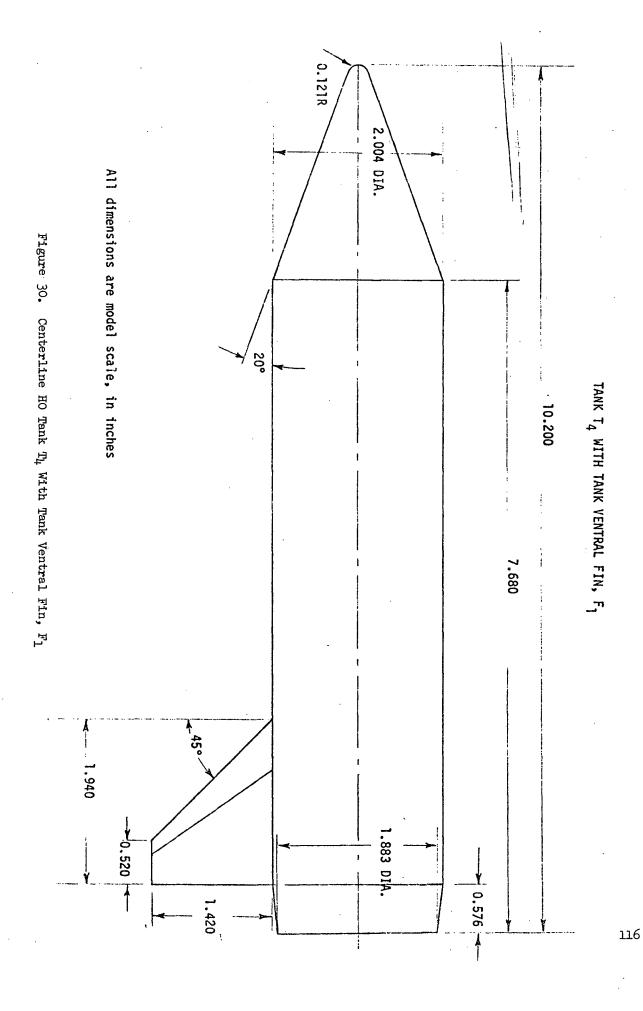
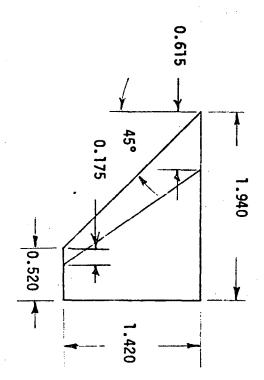


Figure 29. Centerline HO Tank, T3

All dimensions are model scale, in inches.



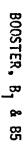
TANK VENTRAL FIN, F1

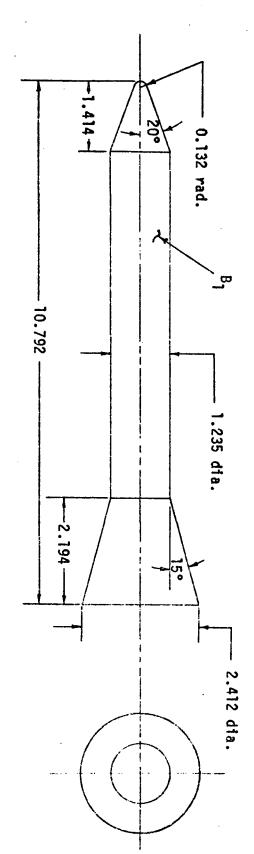


All dimensions are model scale, in inches

Figure 31. Centerline Ventral Fin, F1

↑ 2.194 →





All dimensions are model scale, in inches.

8.85° Ref

1.916 dia.

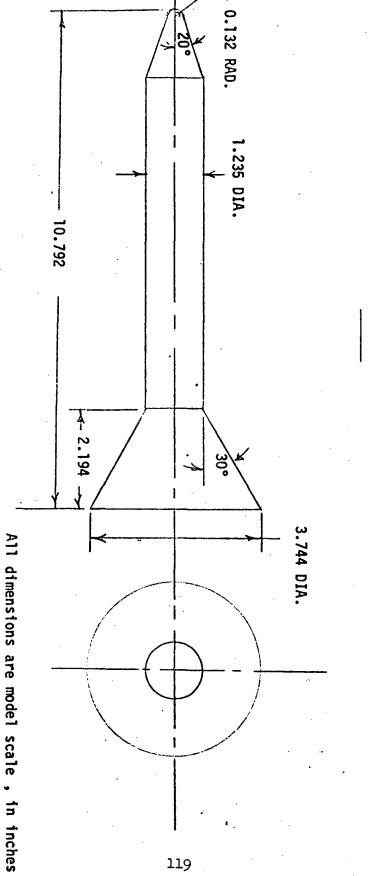


Figure 33. Booster, B₁S₁

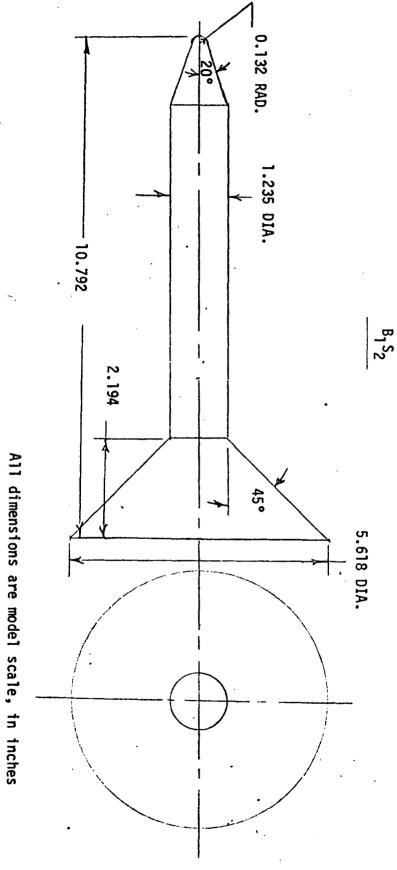


Figure 34. Booster, B₁S₂

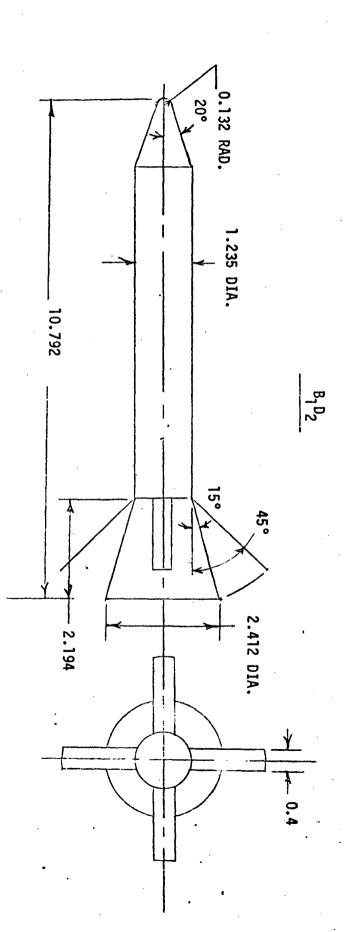


Figure 35. Booster, B₁D₂

All dimensions are model scale, in inches

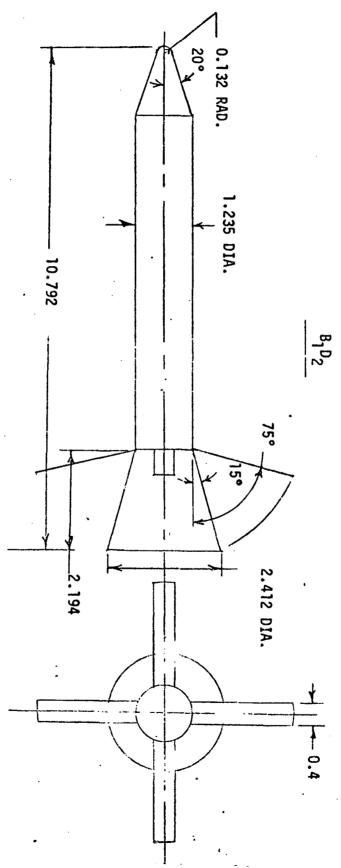


Figure 35. (Continued)

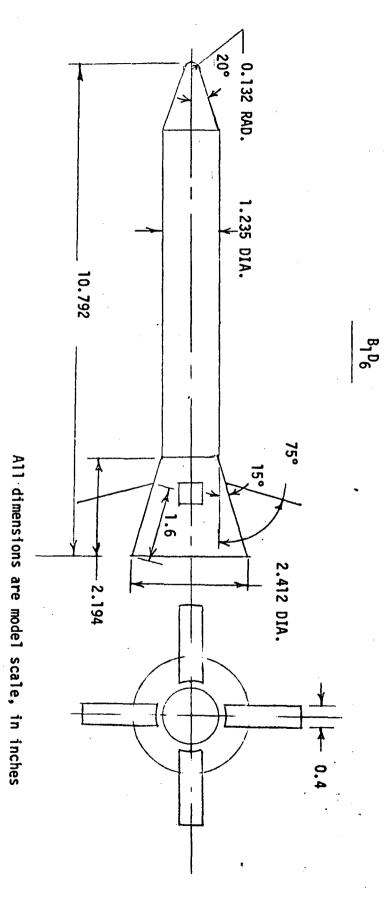


Figure 36. Booster, B₁D₆

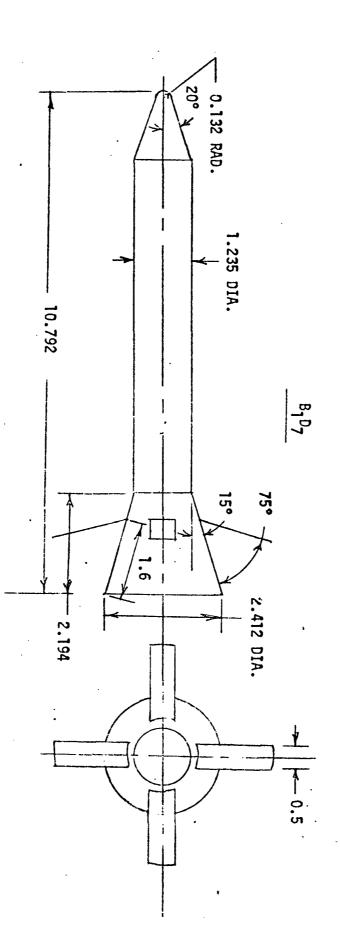


Figure 37. Booster, B1D7

All dimensions are model scale, in inches

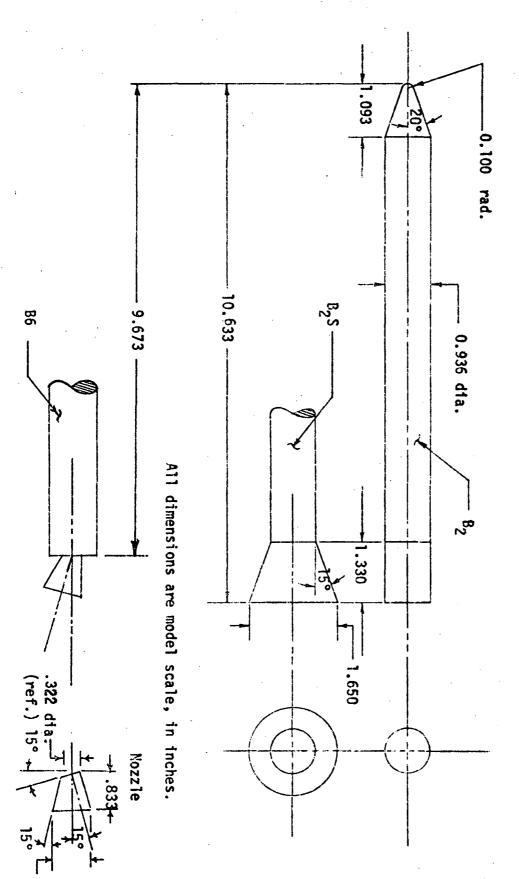
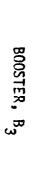


Figure 38. Boosters, B₂, B₂S & B₆

.795 dia.



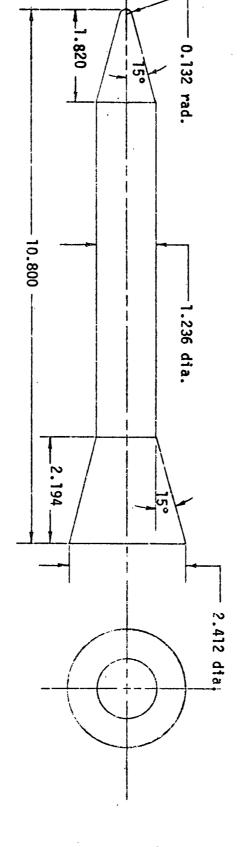


Figure 39. Booster, B3

All dimensions are model scale, in inches.



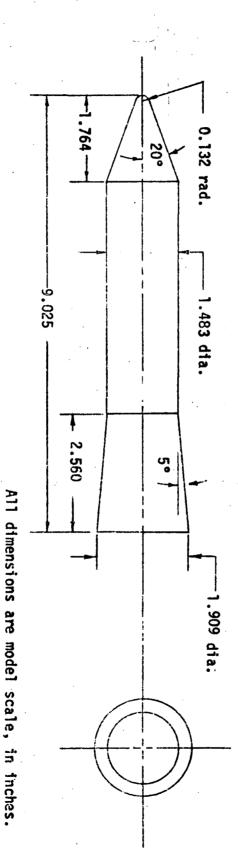
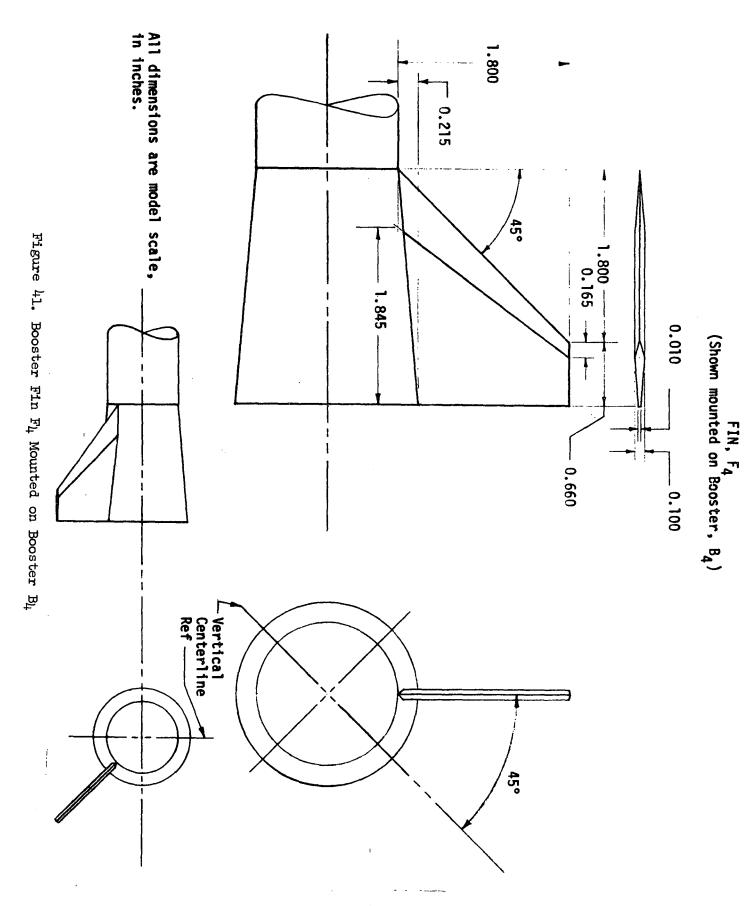
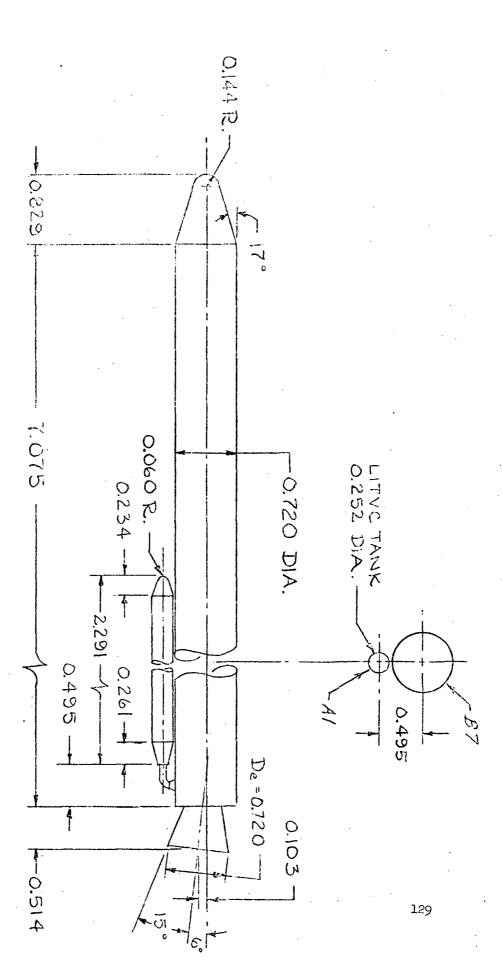


Figure 40. Booster, B4





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Figure 42. Booster, B_7A_1

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HRM 012072

0.6% SCALE MODEL

FORM 25-BF (P5V. 8-69)

Figure 43
3. Plume
Contours :
for Press

LA 3251

ALBANENE® TRAGING PAPER MCDONNELL DOUGLAS ASTRONAUTICS COMPANY

DIVISION

MODEL:

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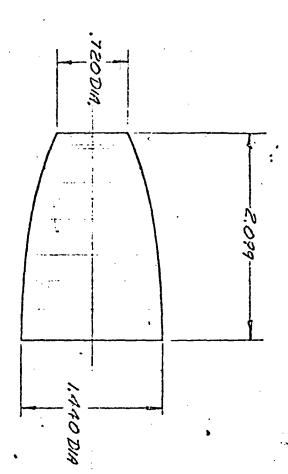
Figure 44. Flume Contours for 156 Inch Solid Rocket Motors

FORM 25-BP (P.IV. 5-59)

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Figure 45. Plume Contour for Orbiter



MIS PLUME-By BOOSTER

M2.2 PUNE-B, BOOSTER

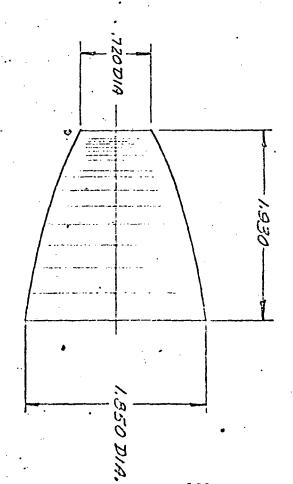


Figure 46. Sketch of Plume for Booster B7

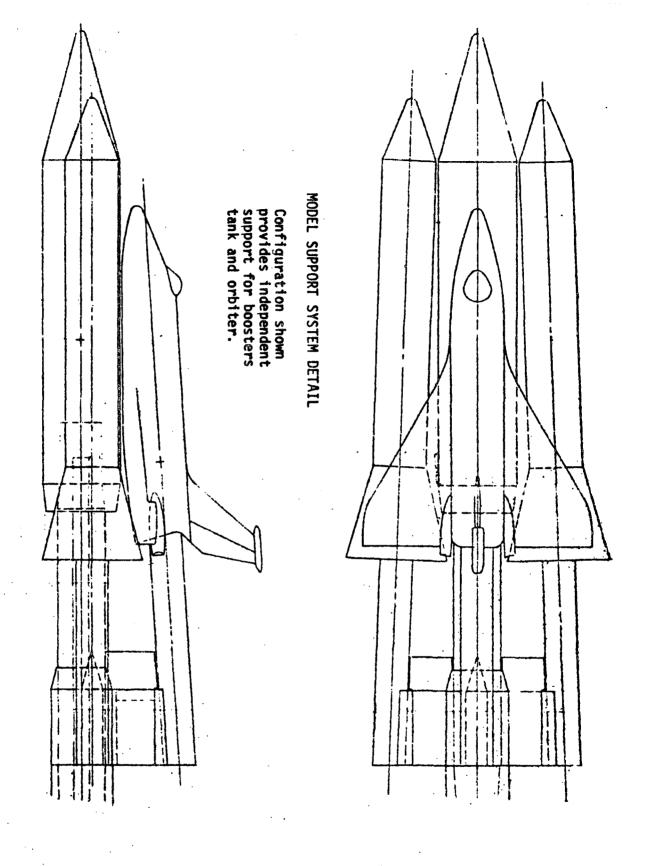


Figure 47. Tunnel Installation for the OBT Configuration-Pitch Series (Orbiter, Tank and Booster Independently Supported)

TUNNEL INSTALLATION FOR THE OBT CONFIGURATION PITCH SERIES

Boosters and Orbiter fixed to centerline tank.

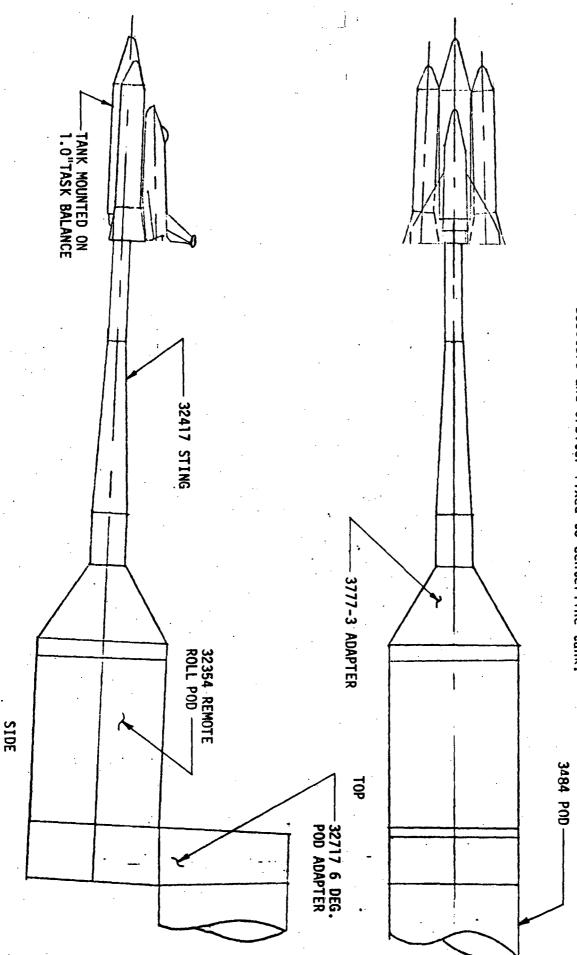


Figure 48. Tunnel Installation for the OBT Configuration-Pitch Series (Booster and Orbiter Fixed to Centerline Tank)

TUNNEL INSTALLATION FOR THE OBT CONFIGURATION PITCH SERIES

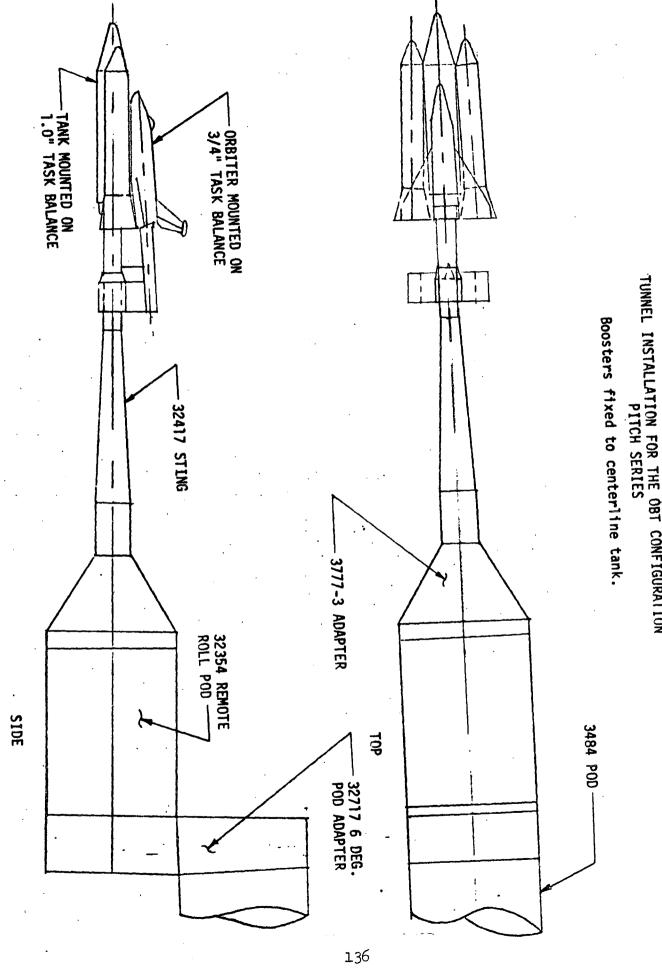


Figure 49. Tunnel Installation for the OBT Configuration-Pitch Series (Booster Fixed to Centerline Tank)

TUNNEL INSTALLATION FOR THE OBT CONFIGURATION PITCH SERIES

Right Booster fixed to centerline tank, left Booster Independently supported.

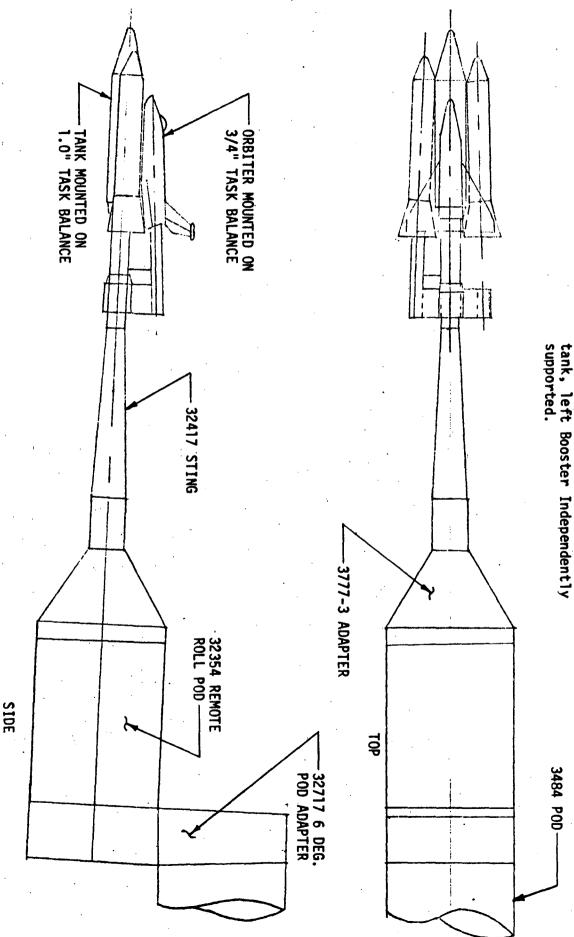


Figure 50. Tunnel Installation for the OBT Configuration-Pitch Series (Right Booster Fixed to Centerline Tank, Left Booster Independently Supported)

TUNNEL INSTALLATION FOR THE OBT CONFIGURATION PITCH SERIES

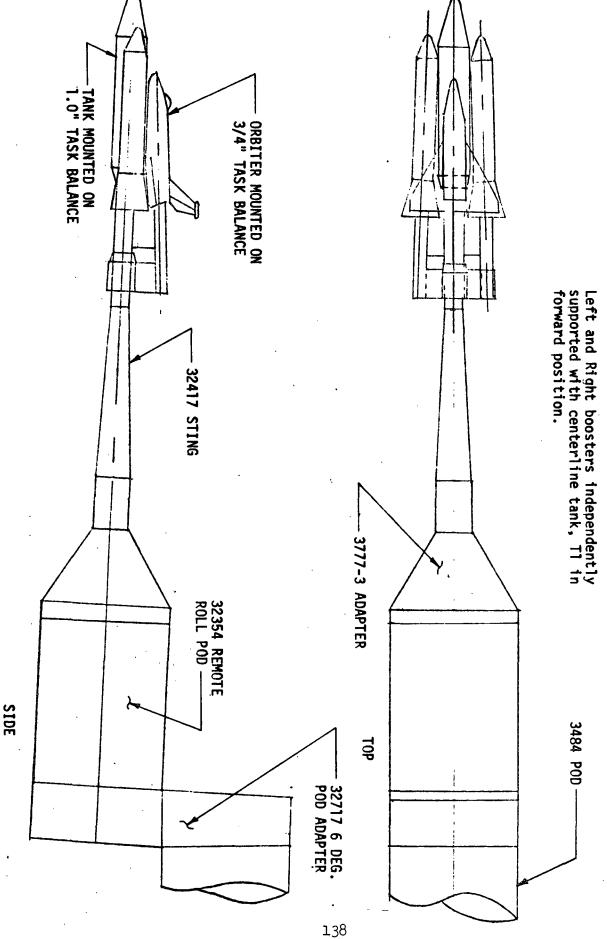


Figure 51. Tunnel Installation for the OBT Configuration-Pitch Series (Left and Right Booster Independently Supported)

TUNNEL INSTALLATION FOR THE OBT CONFIGURATION PITCH SERIES

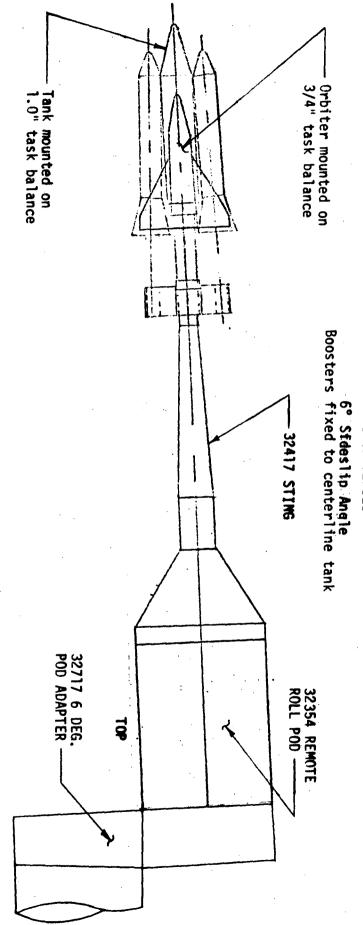
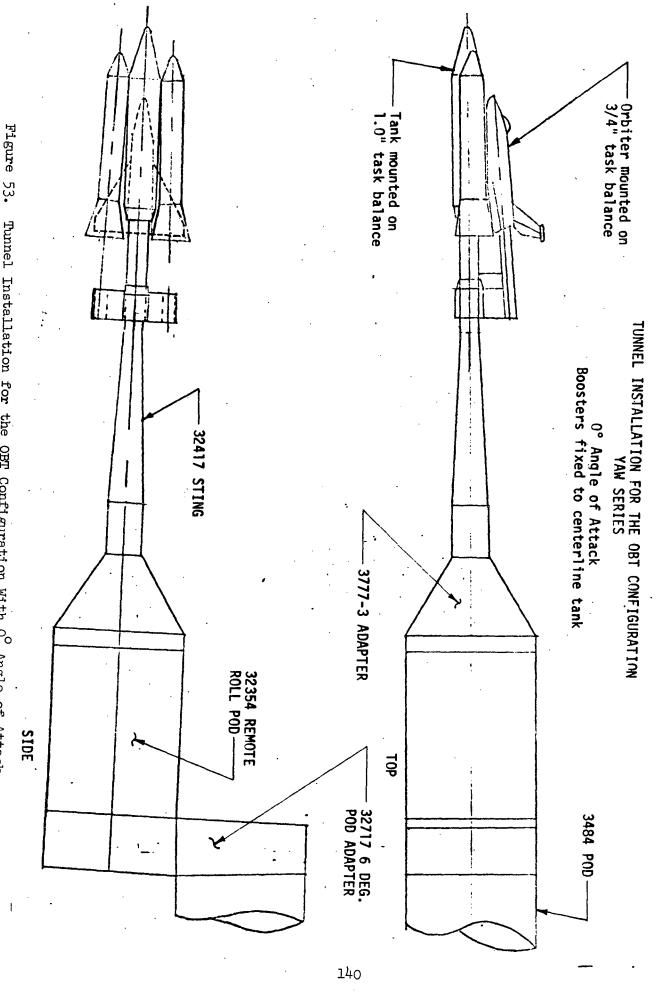


Figure 52. Tunnel Installation for the OBT Configuration With $6^{\rm O}$ Sideslip Angle-Pitch Series (Boosters Fixed to Centerline Tank) 3777-3 ADAPTER SIDE

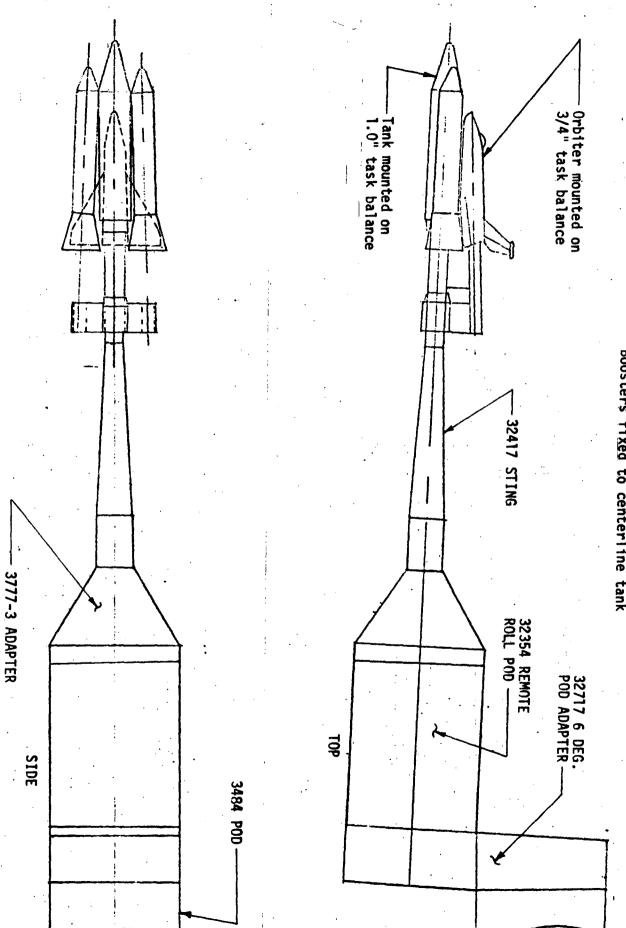
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Tunnel Installation for the OBT Configuration With $0^{\rm O}$ Angle of Attack-Yaw Series (Boosters Fixed to Centerline Tank)

TUNNEL INSTALLATION FOR THE OBT CONFIGURATION YAW SERIES

6° Angle of Attack Boosters fixed to centerline tank



141

Figure 54. Tunnel Installation for the OBT Configuration With 6° Angle of Attack-Yaw Series (Boosters Fixed to the Centerline Tank)

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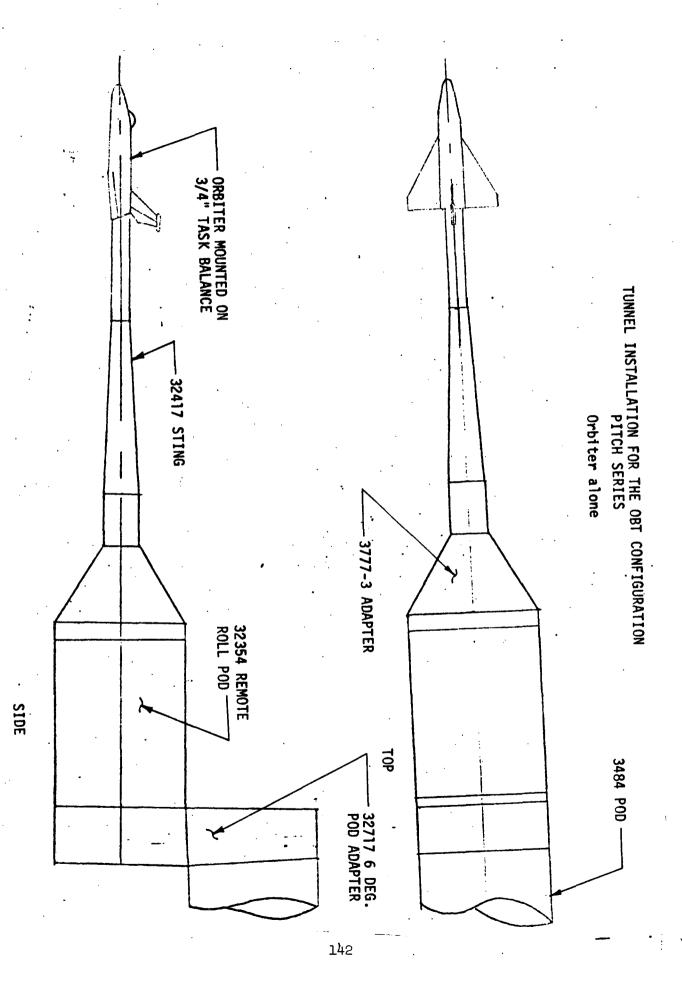


Figure 55. Tunnel Installation for the Orbiter Alone Configuration

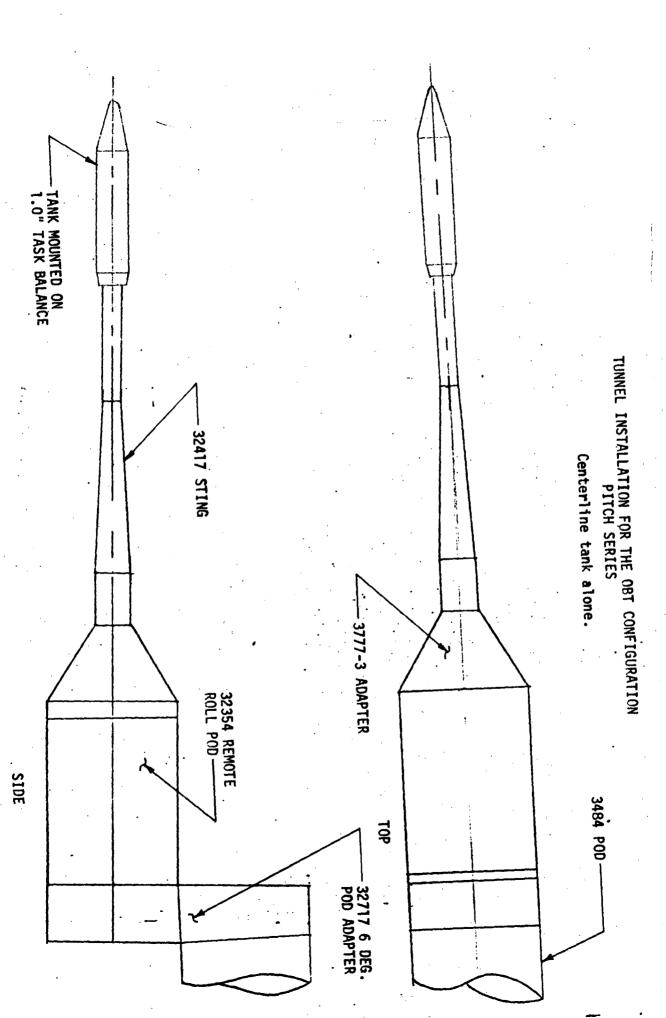


Figure 56. Tunnel Installation for the Tank Alone Configuration

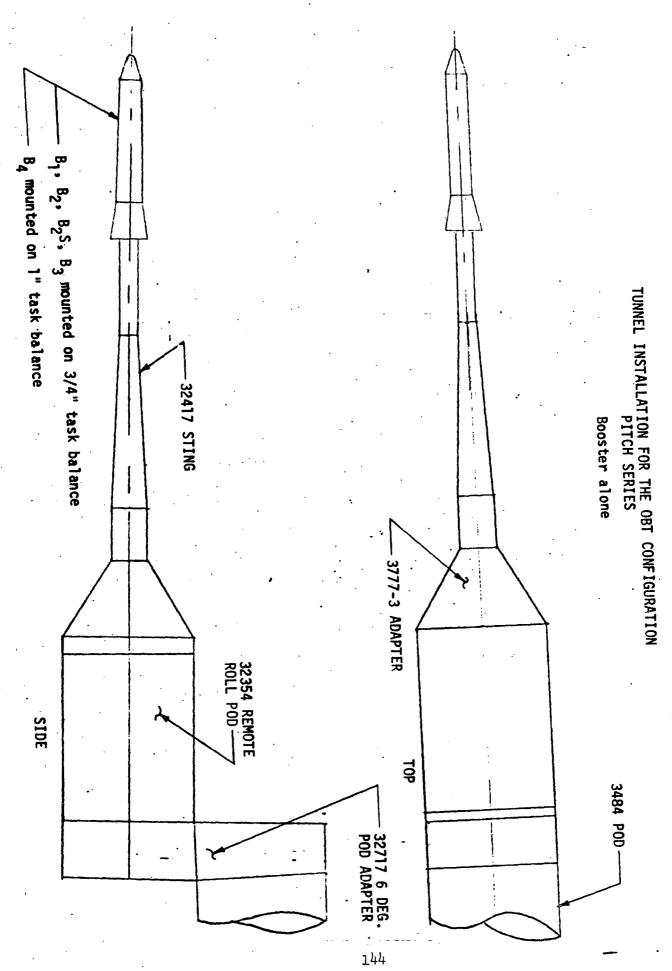
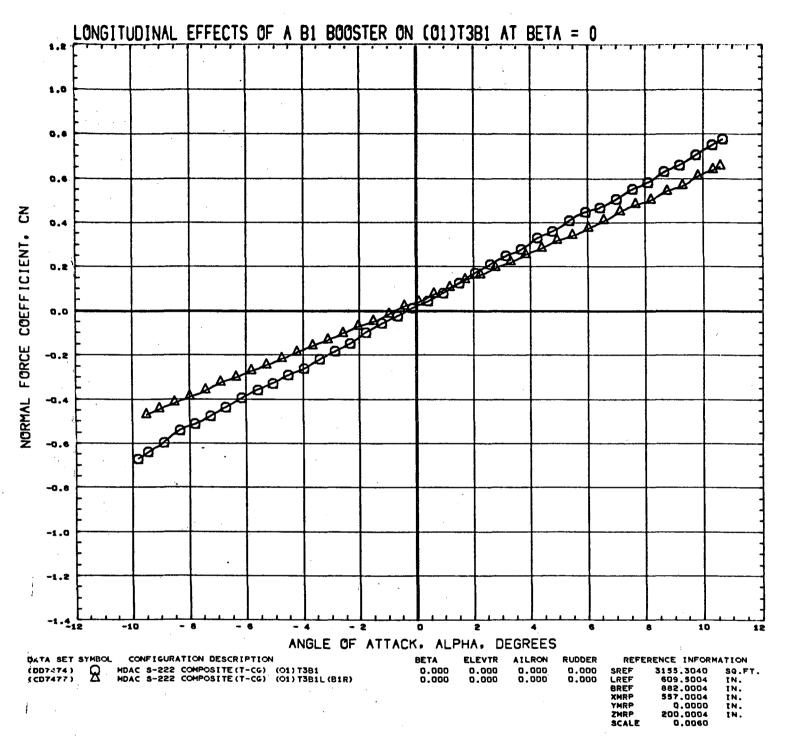


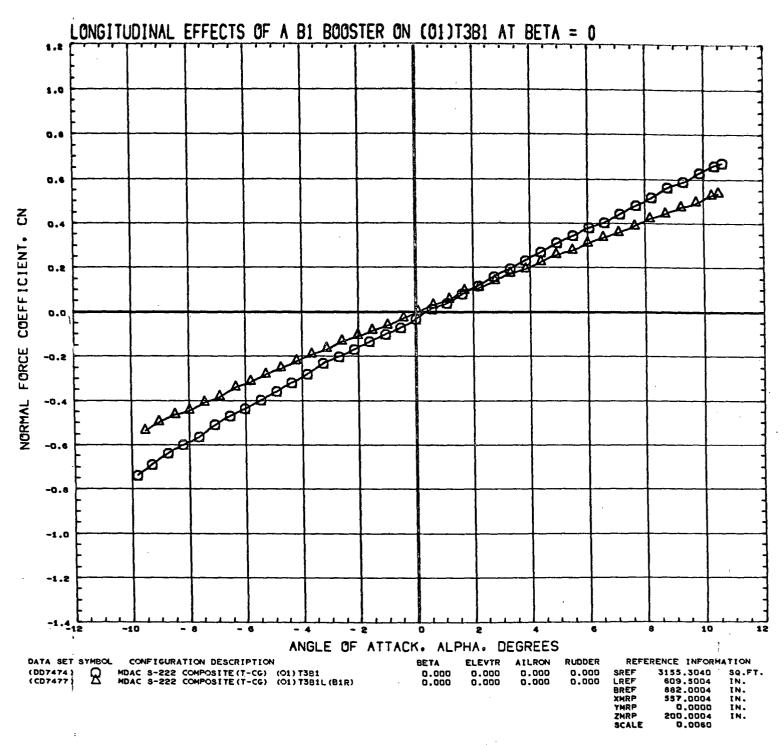
Figure 57. Tunnel Installation for the Booster Alone Configuration

DATA FIGURES

Tabulations of the plotted data and corresponding source data are available from SADSAC Operations.



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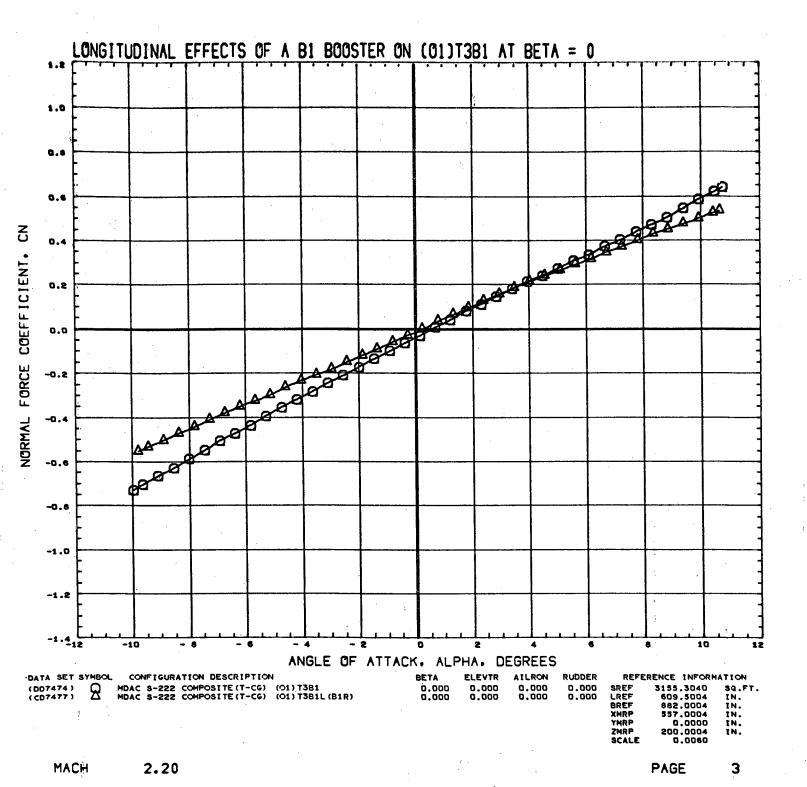


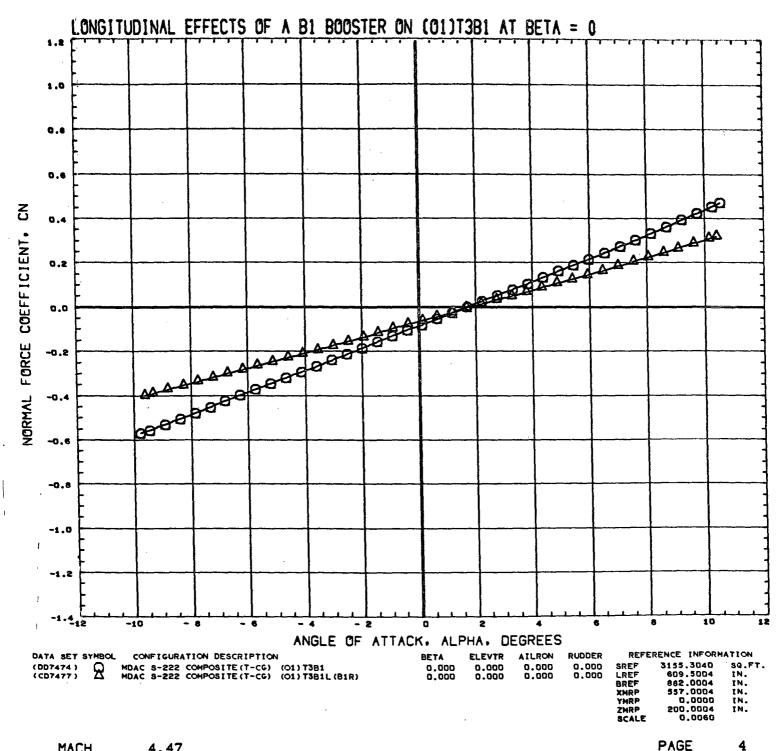
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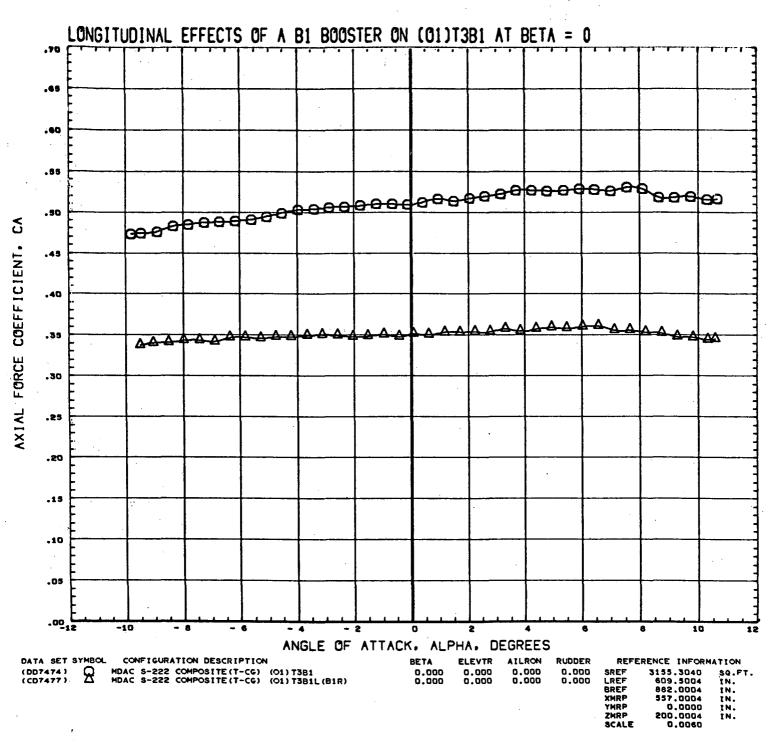
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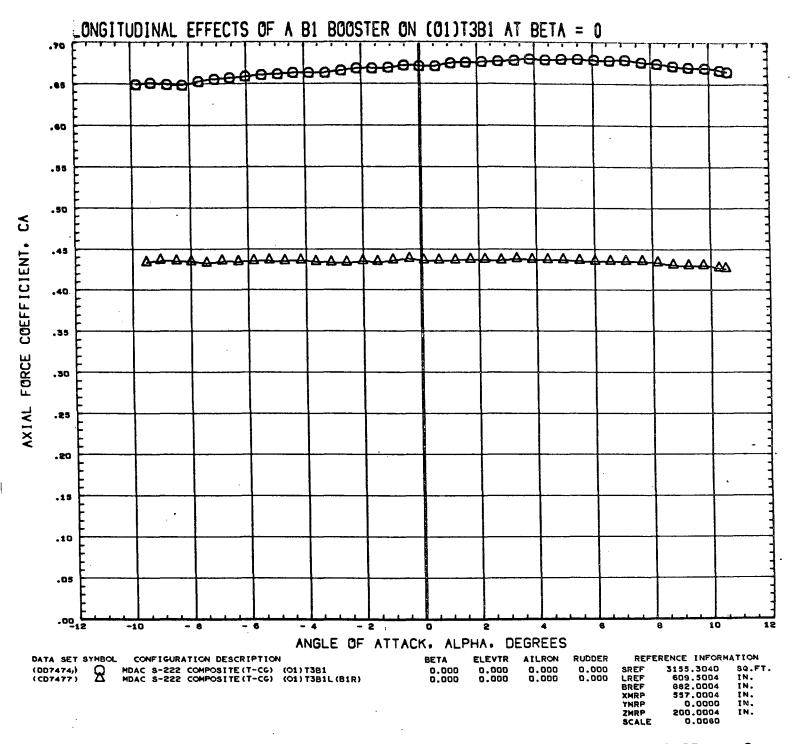


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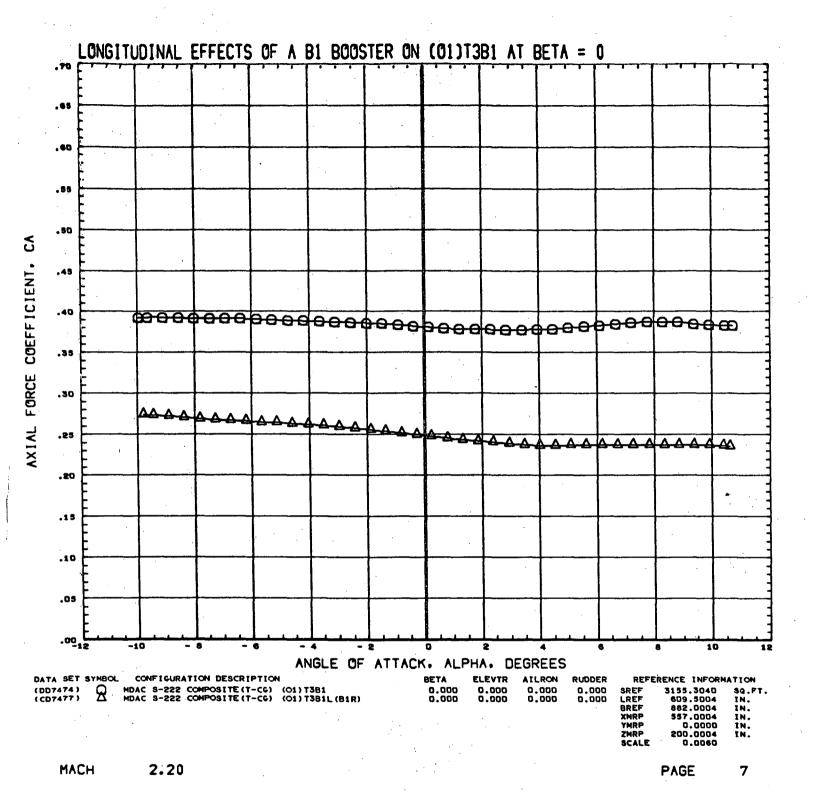
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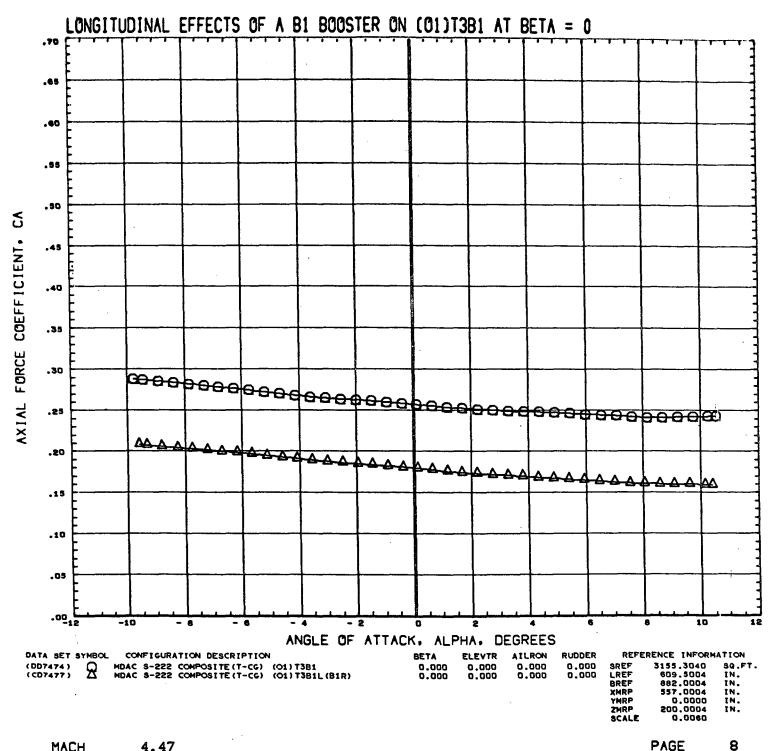


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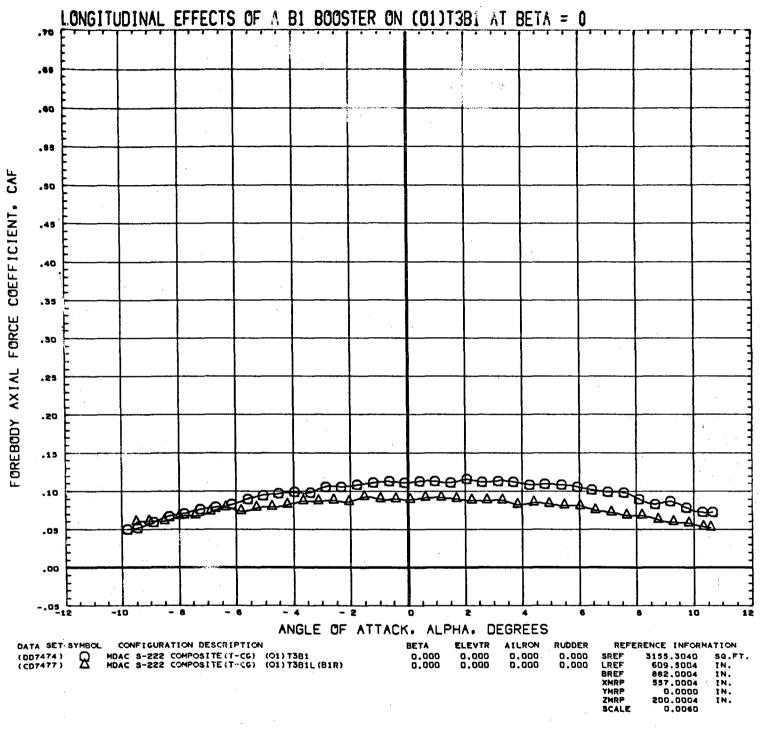


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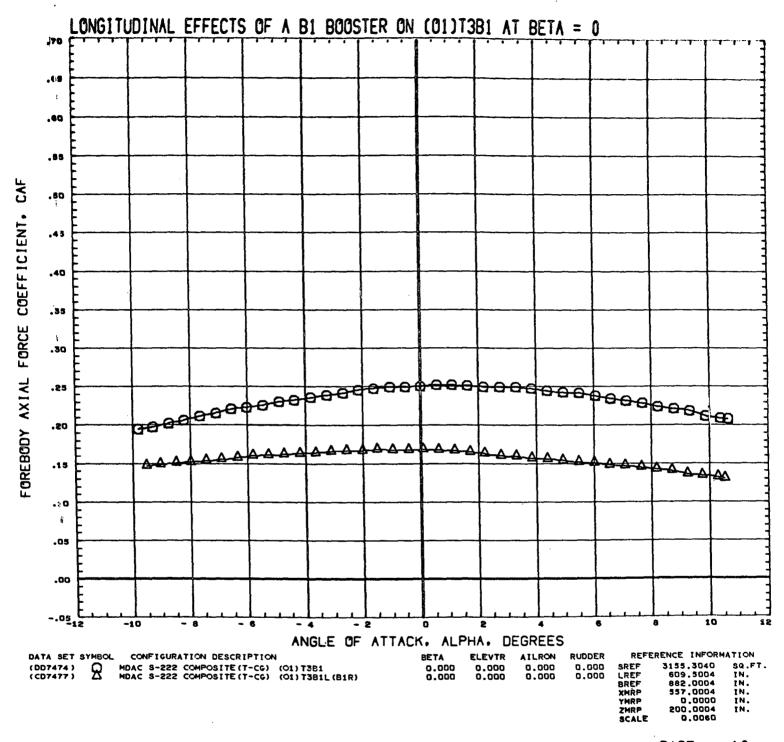


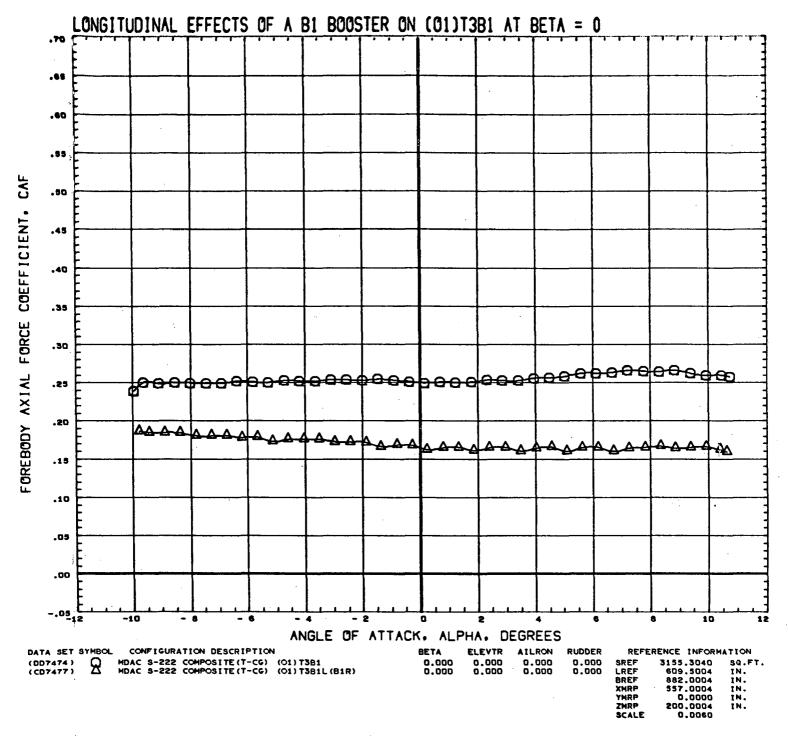


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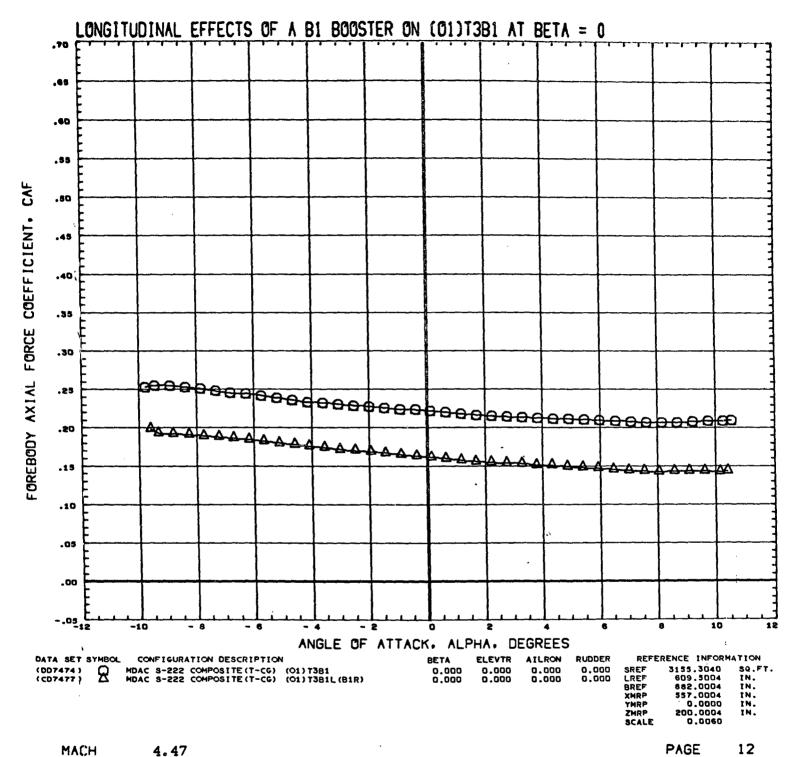


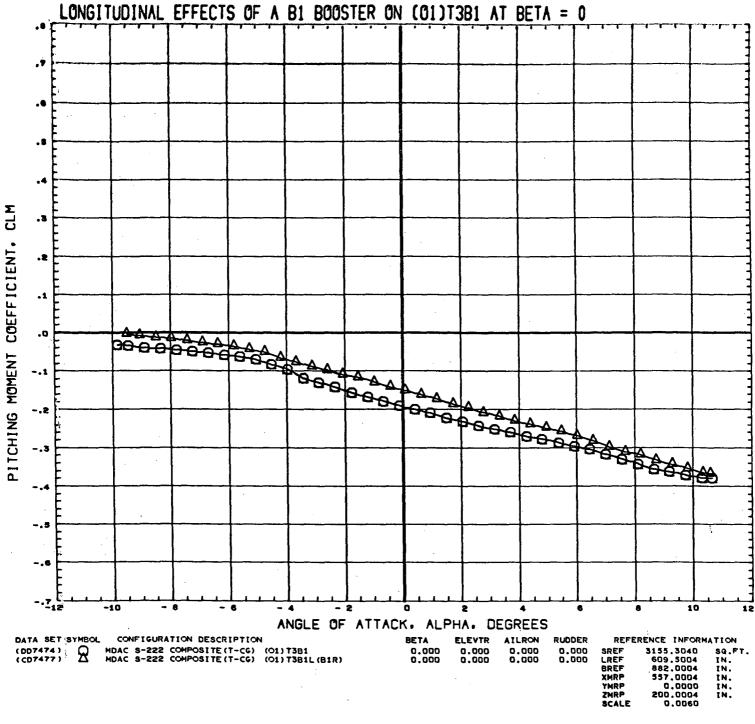
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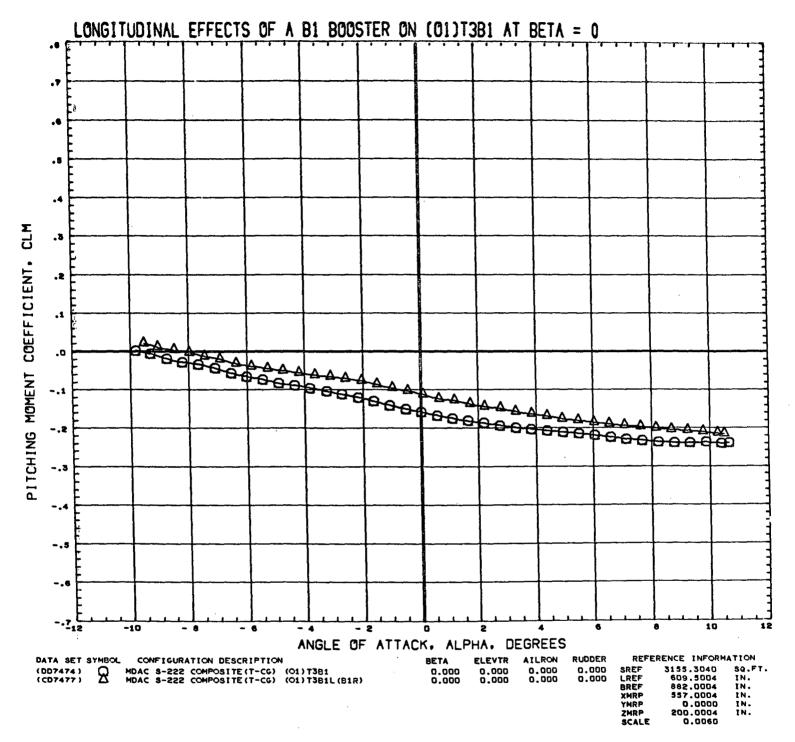


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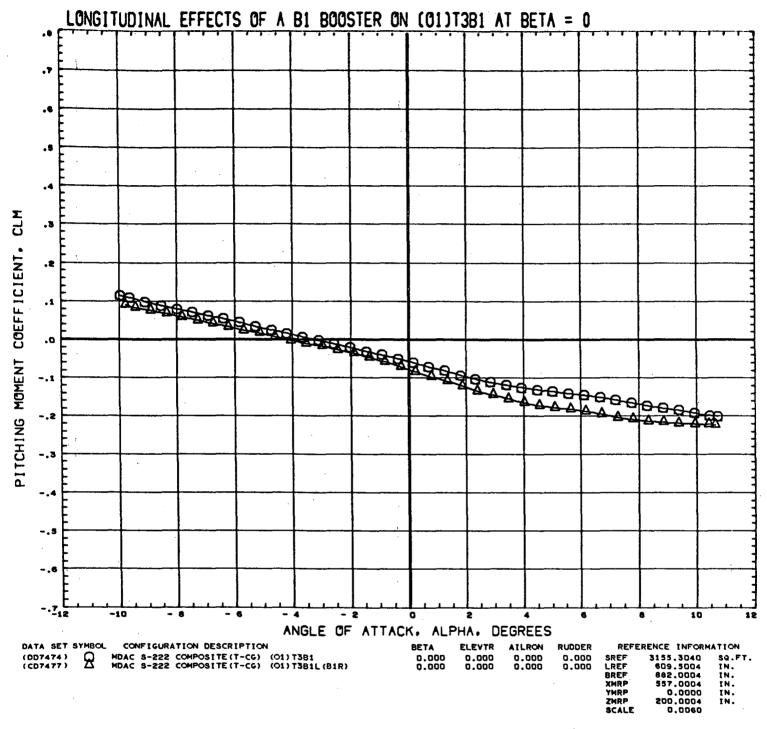
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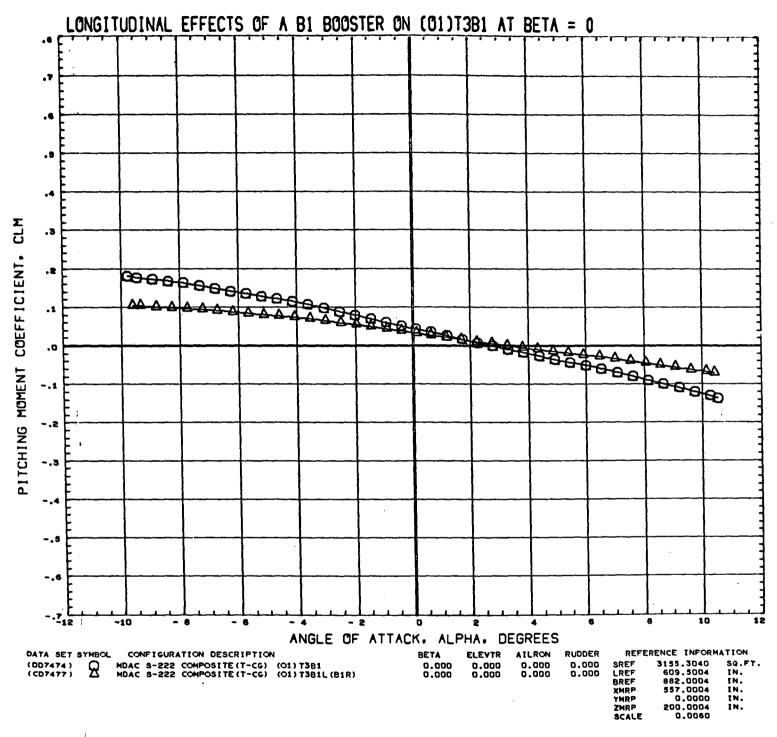
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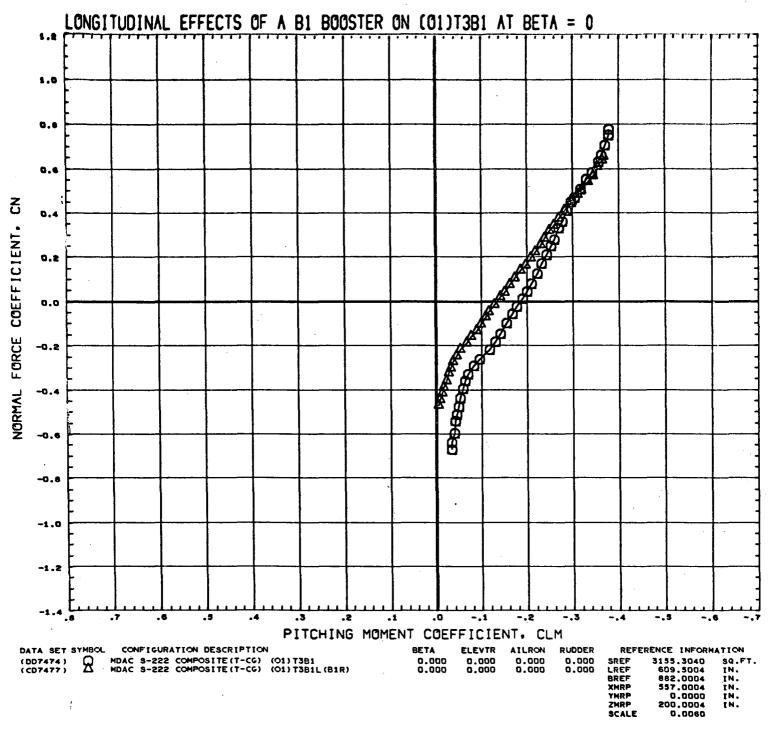
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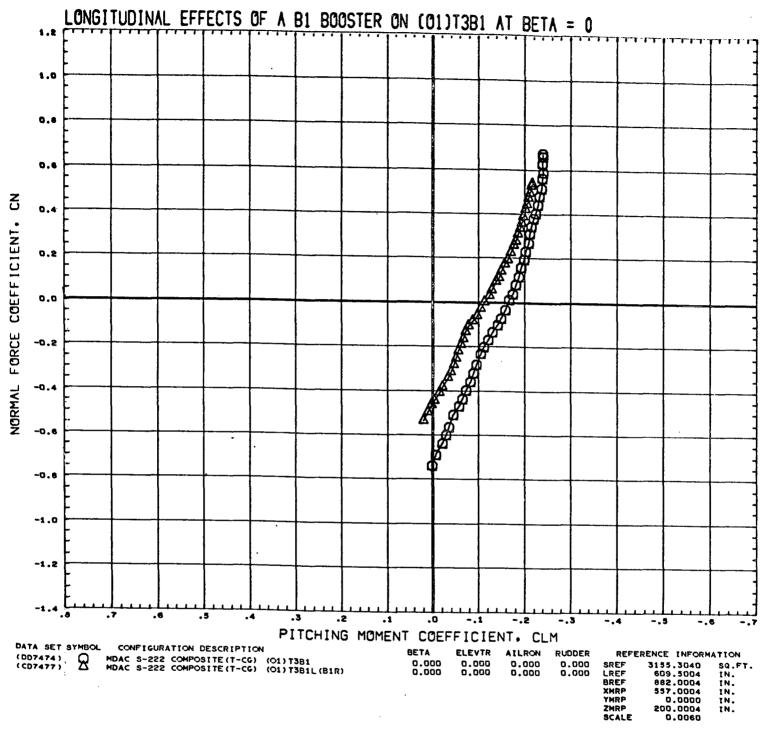
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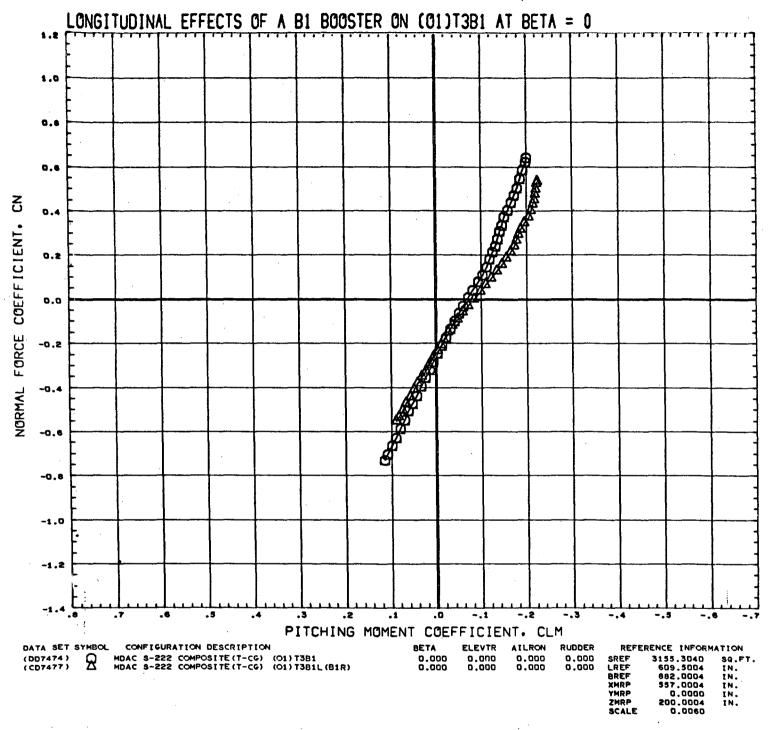
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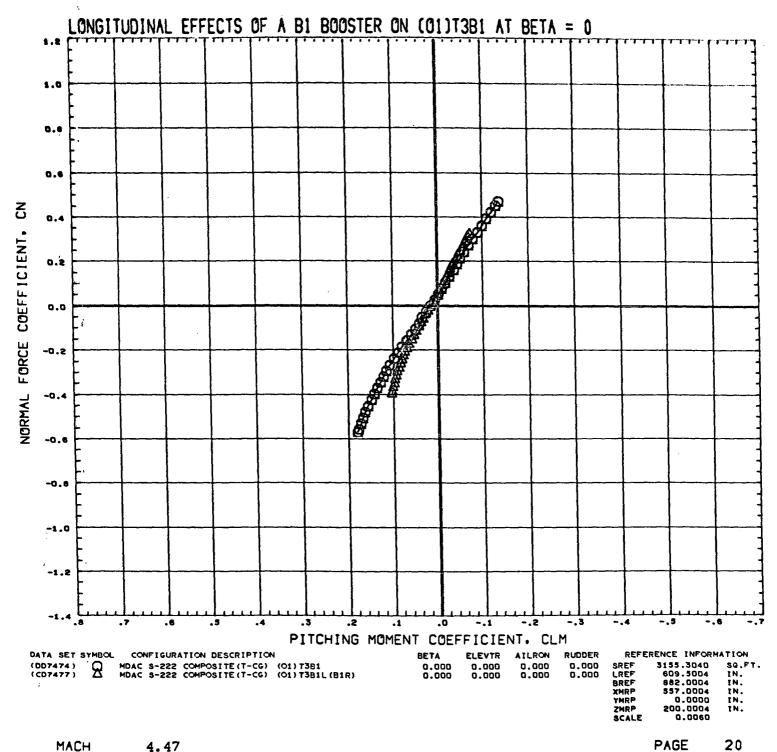
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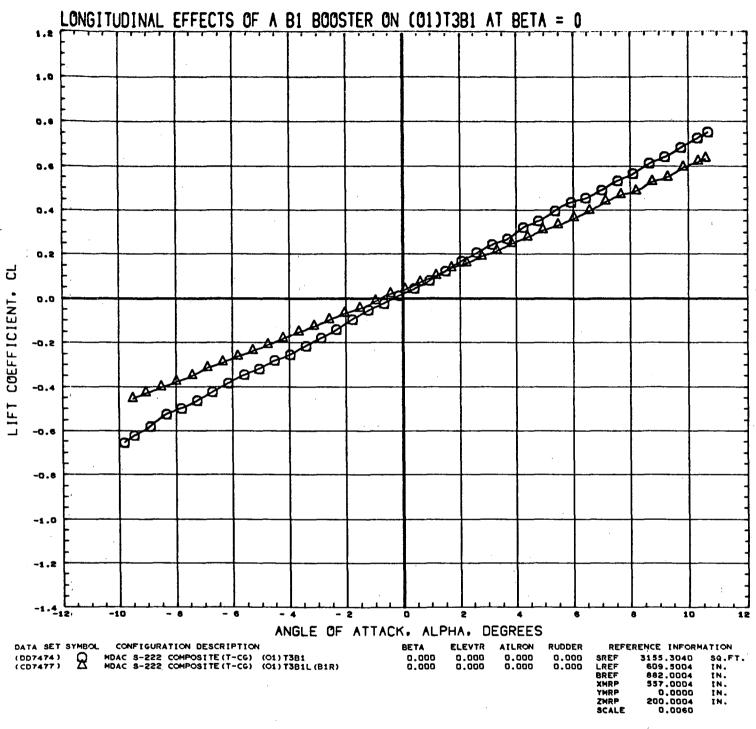
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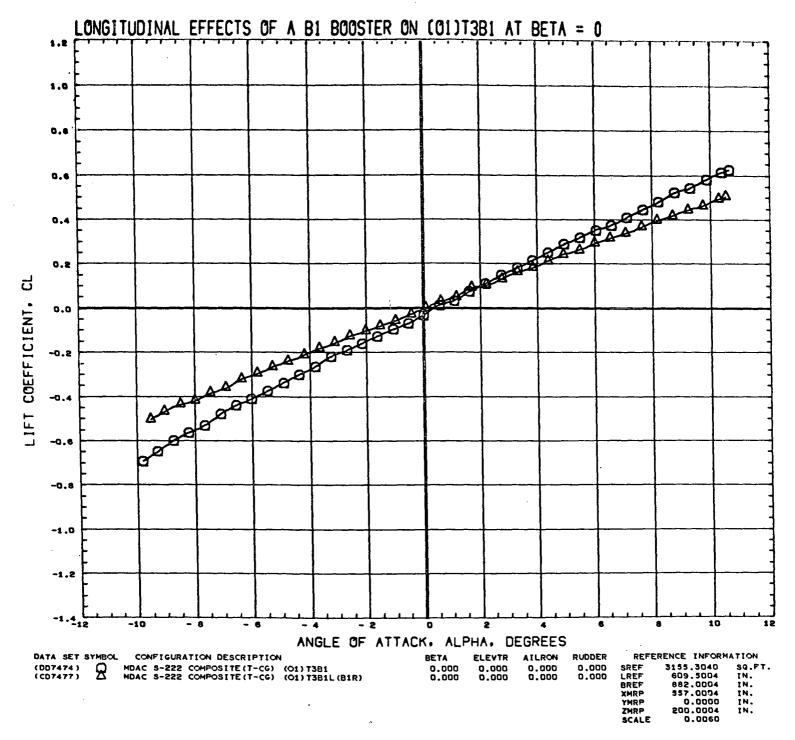
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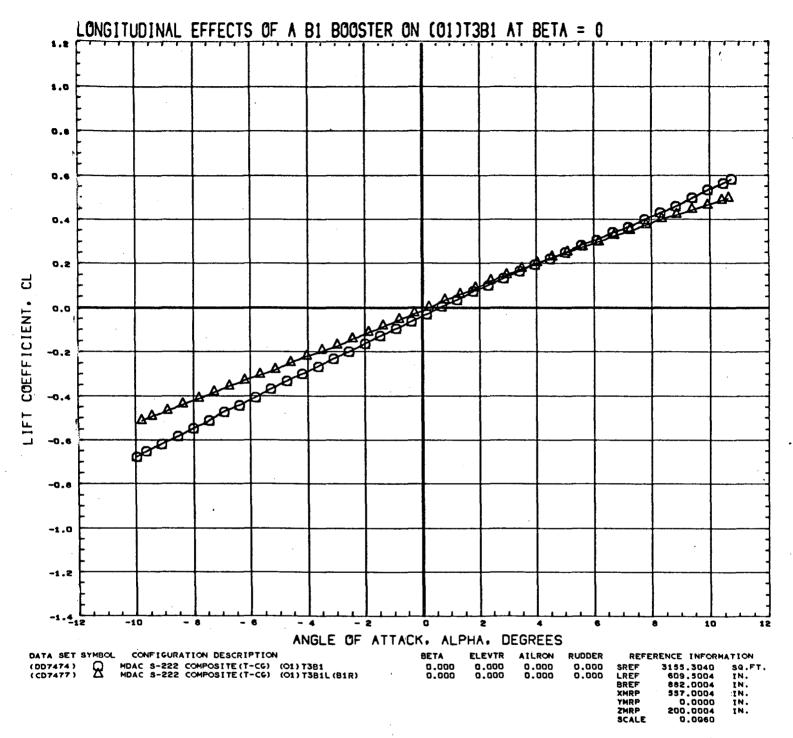


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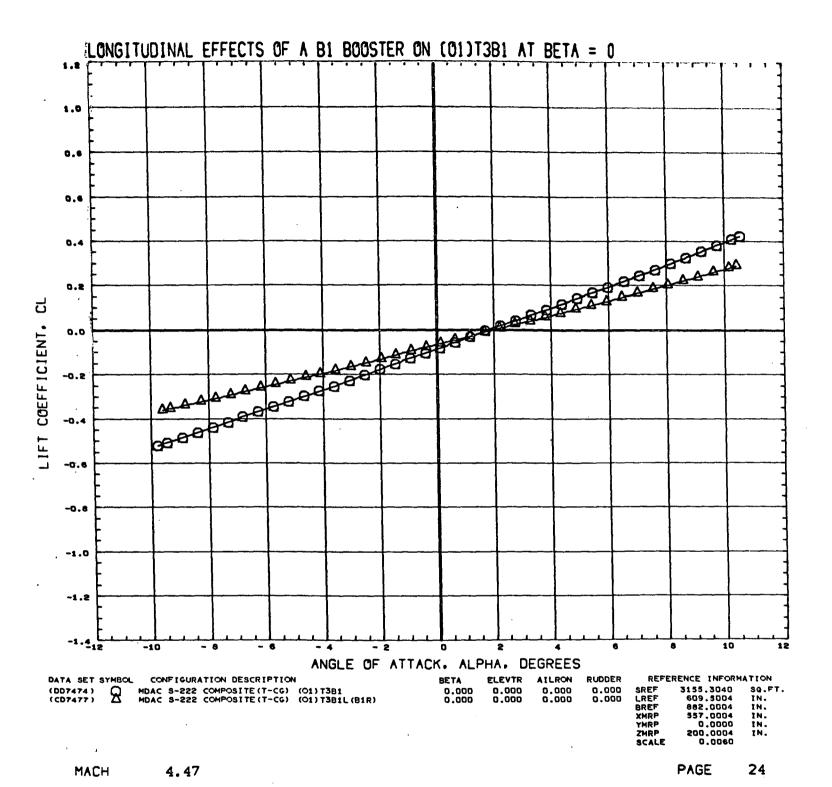


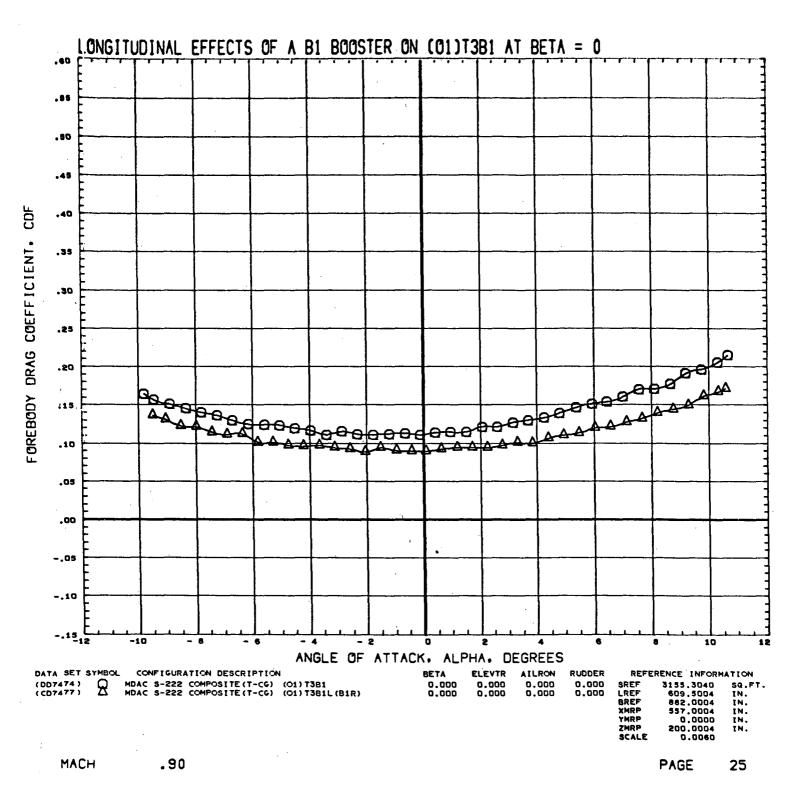
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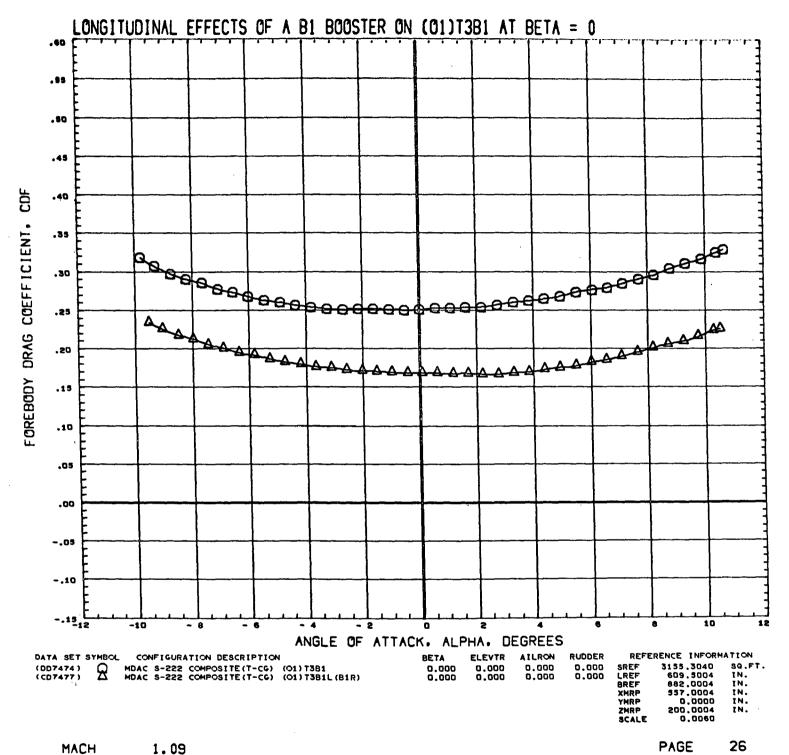


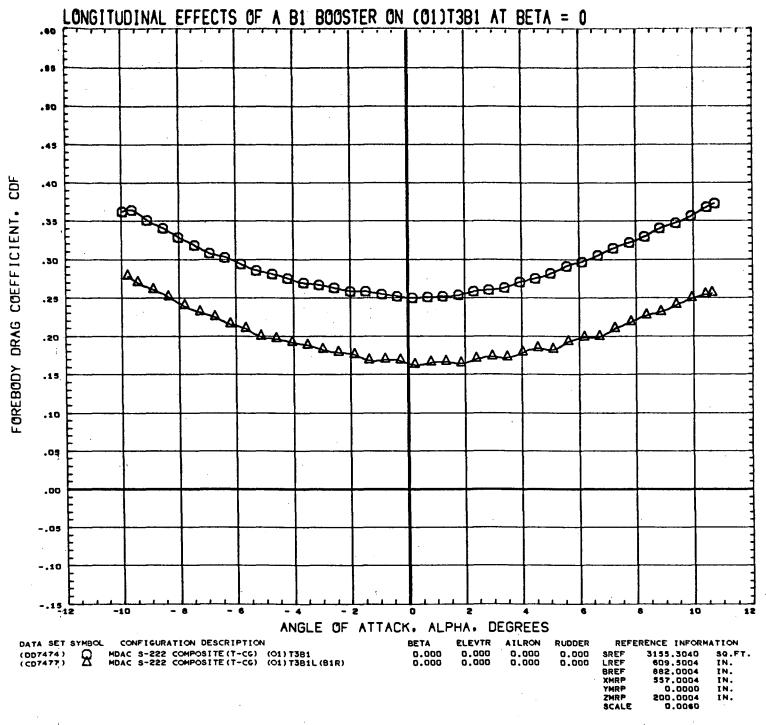


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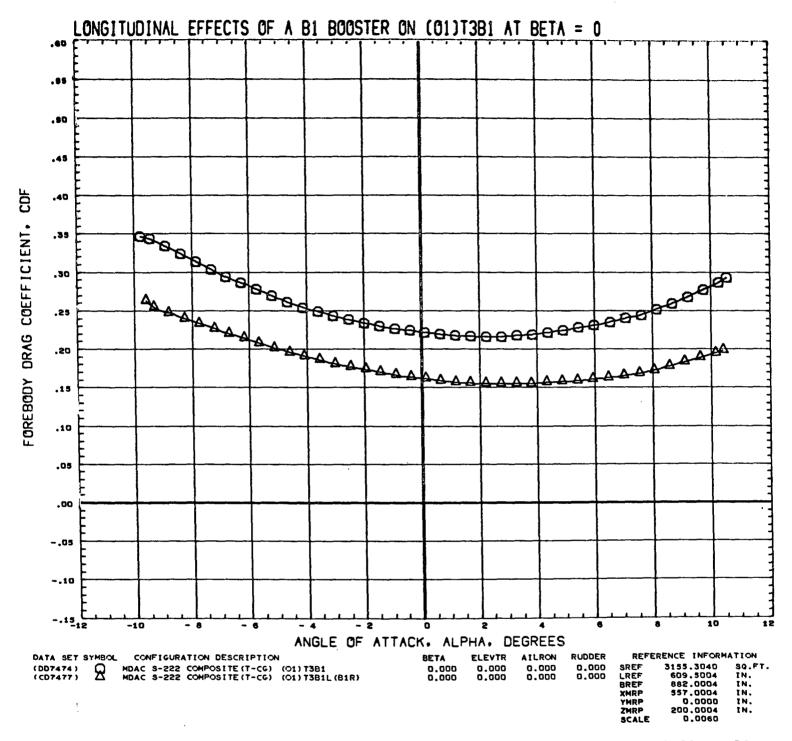


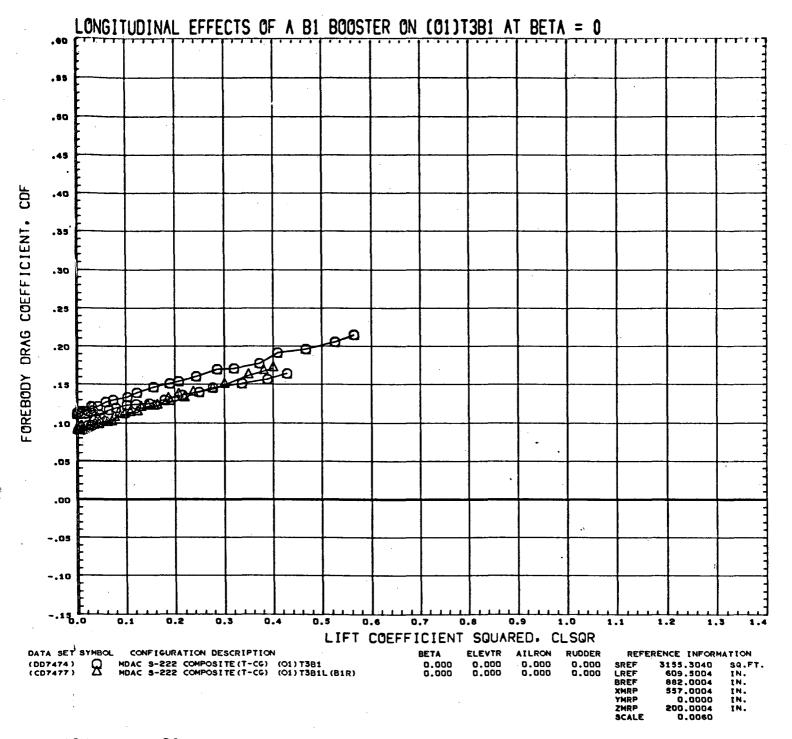




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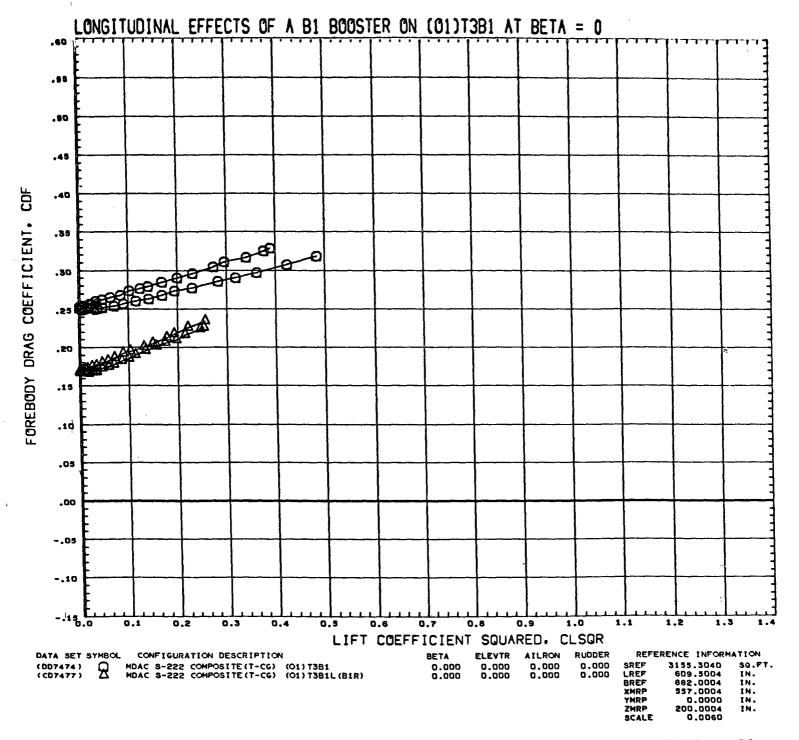
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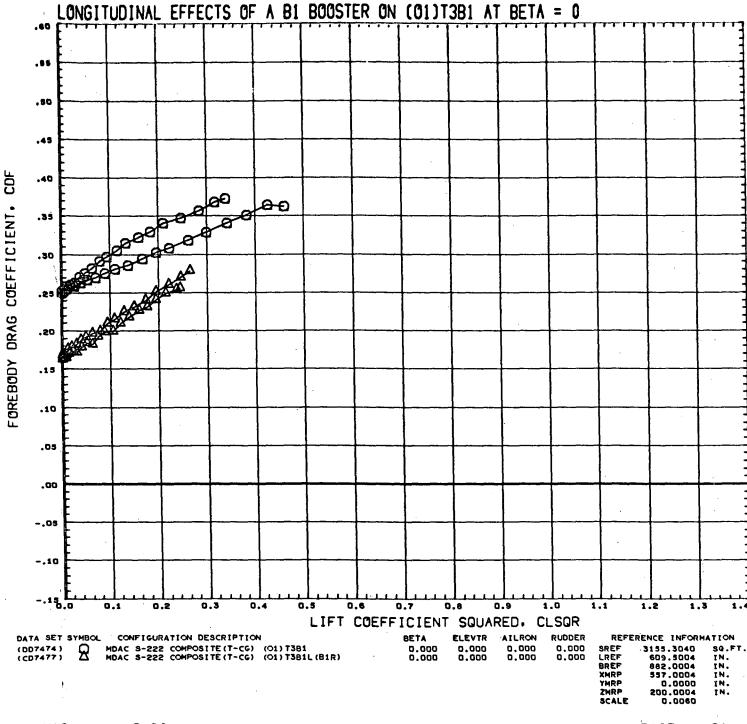


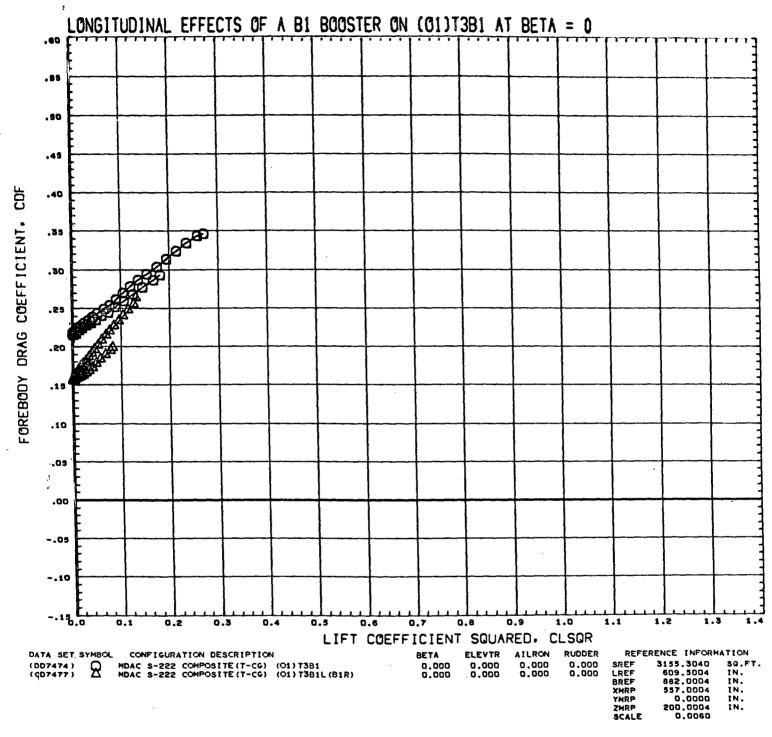


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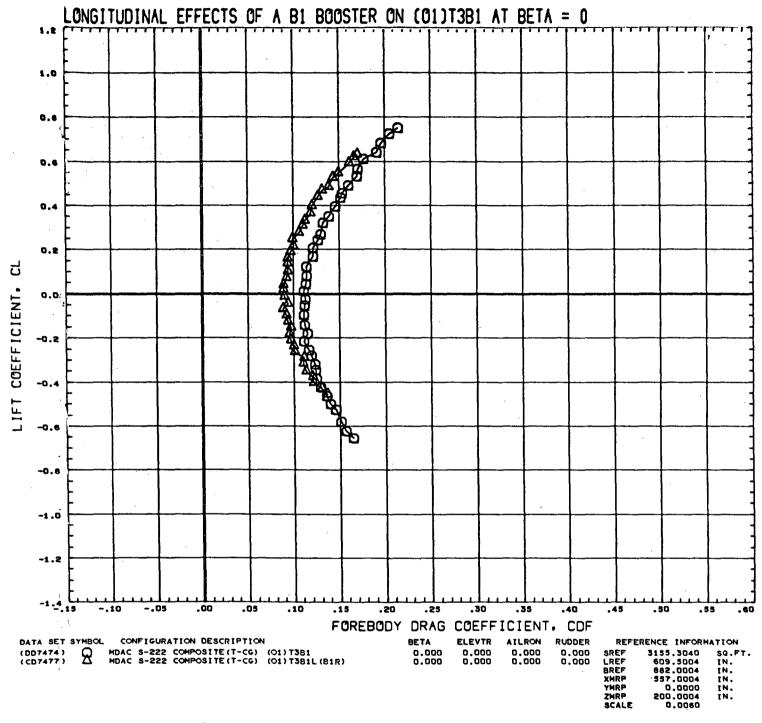




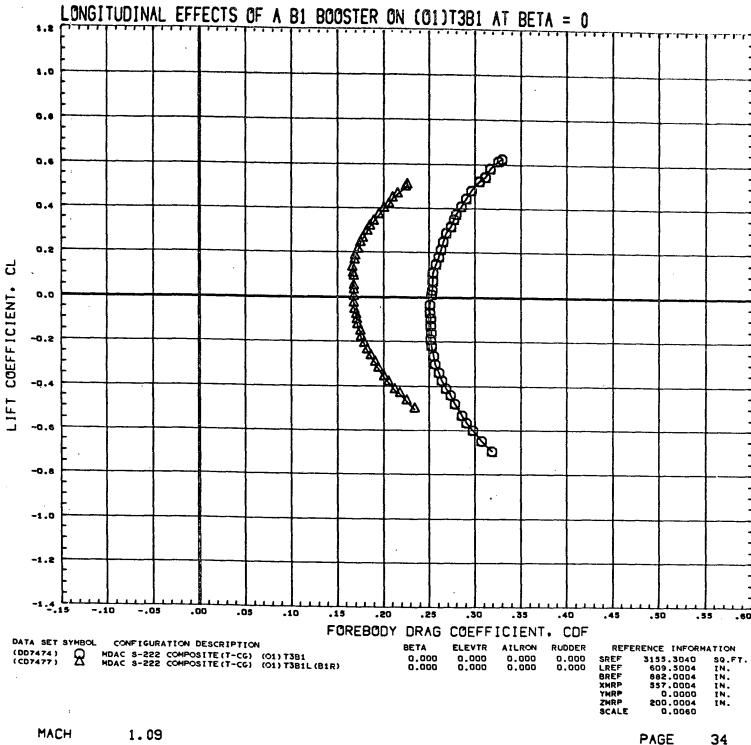


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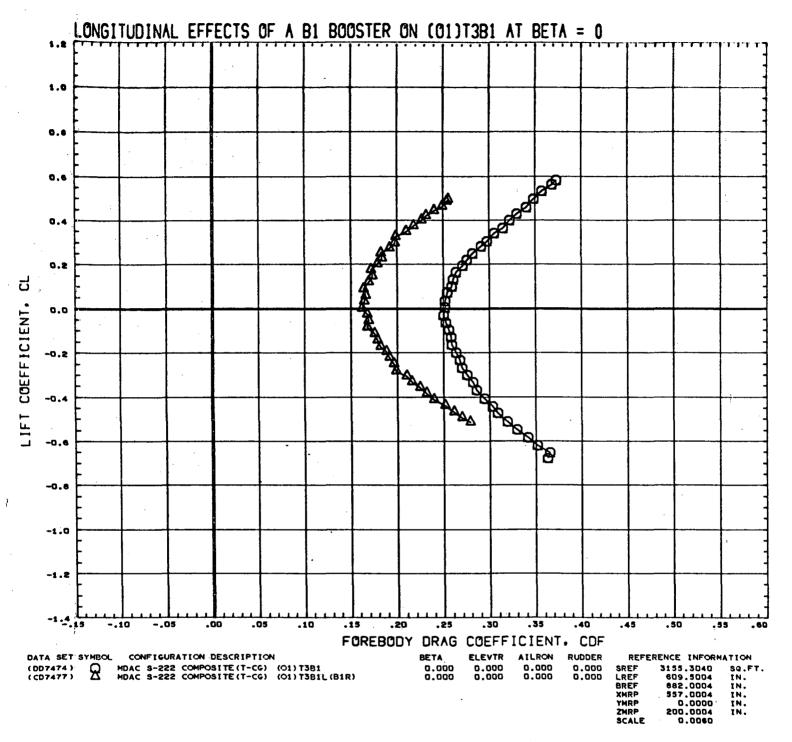
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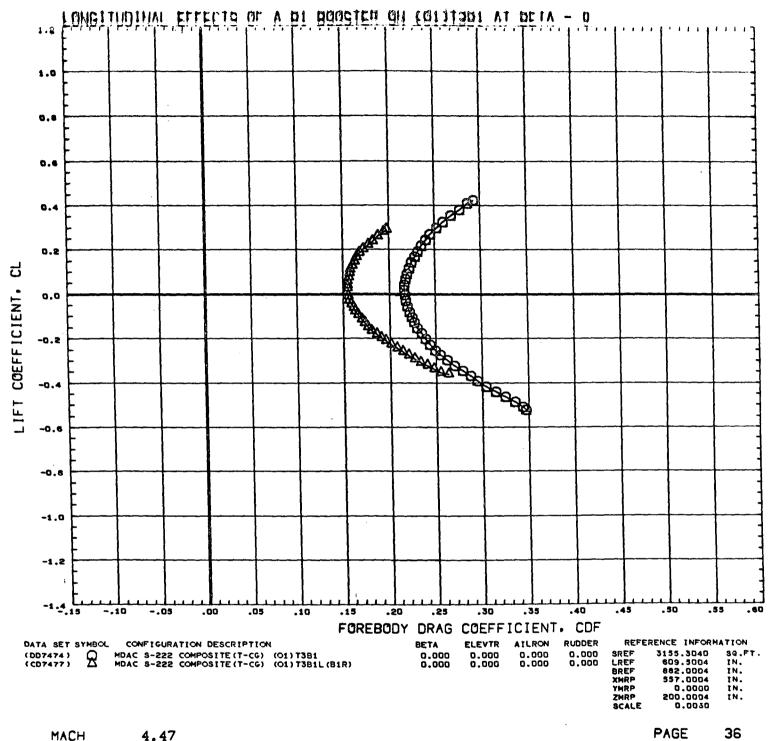
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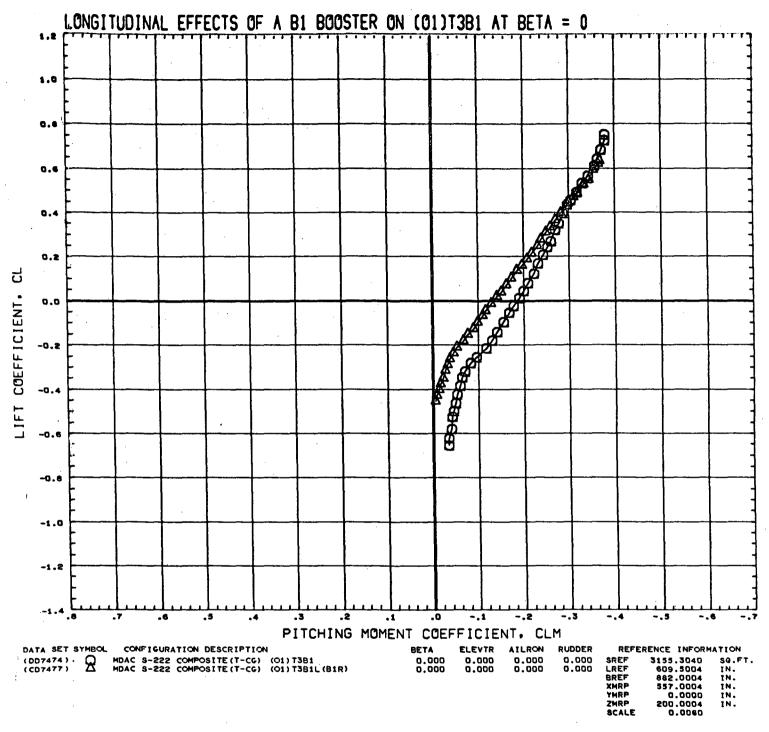
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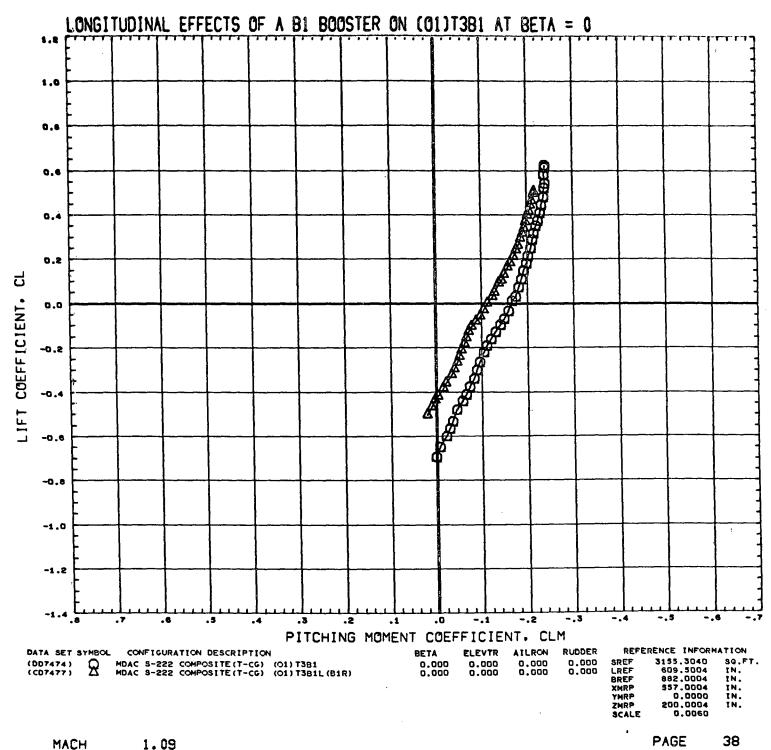
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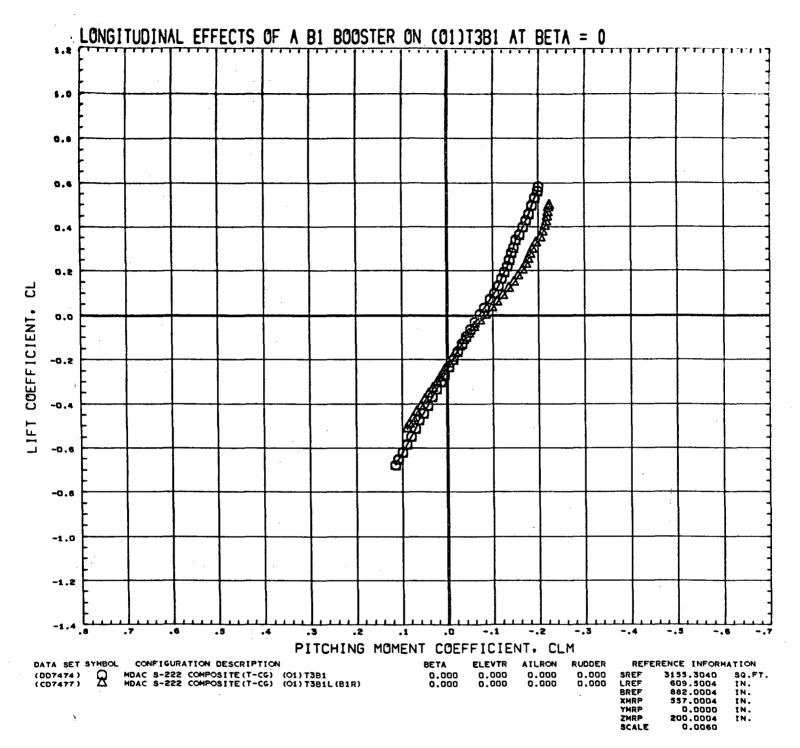


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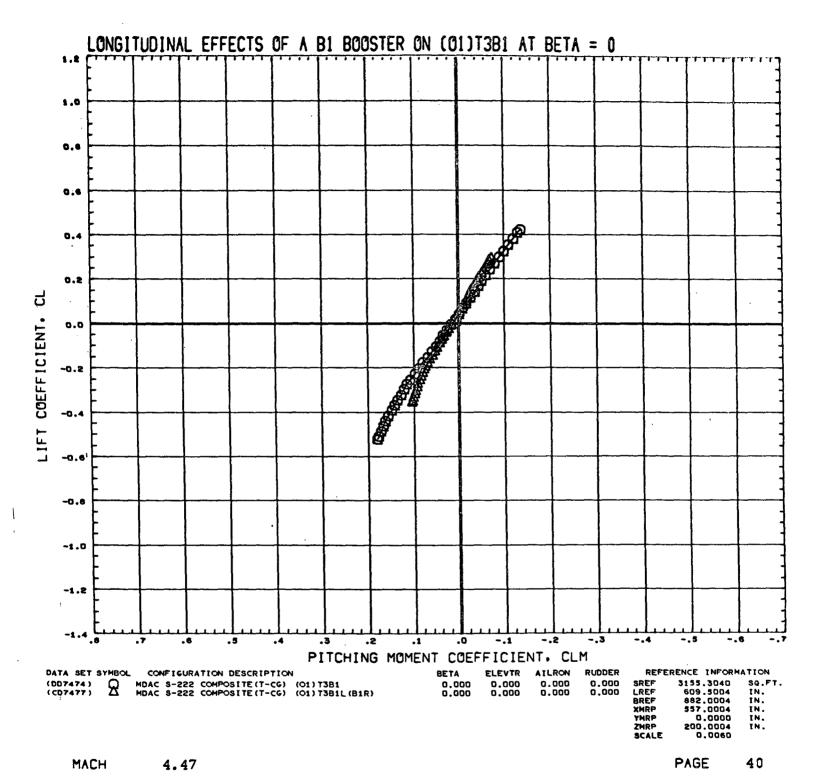
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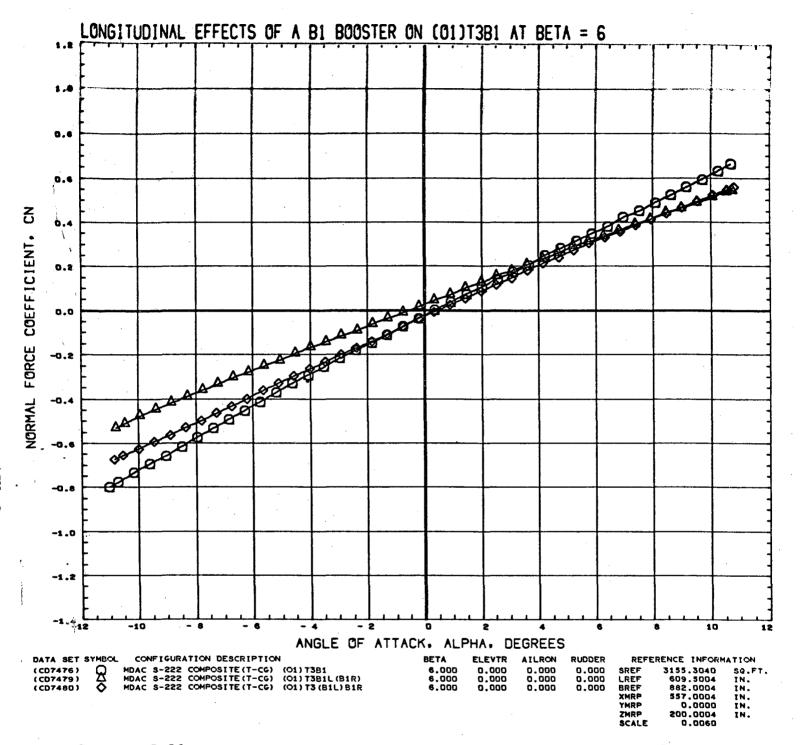
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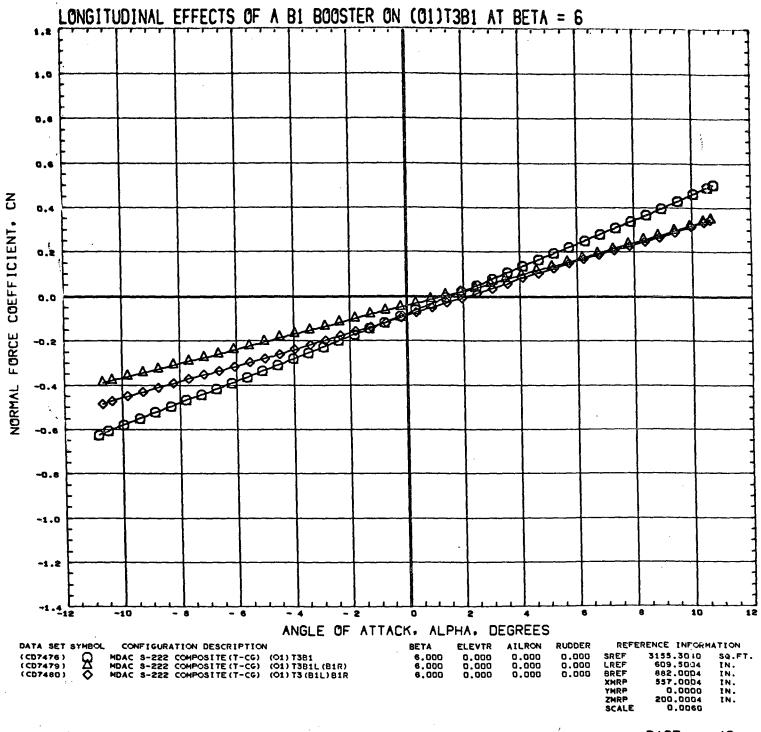


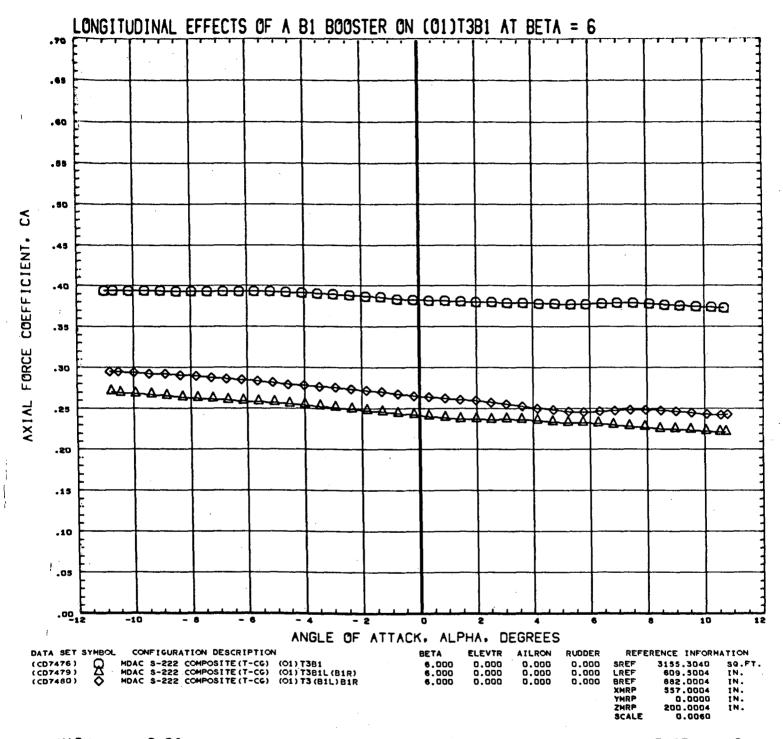
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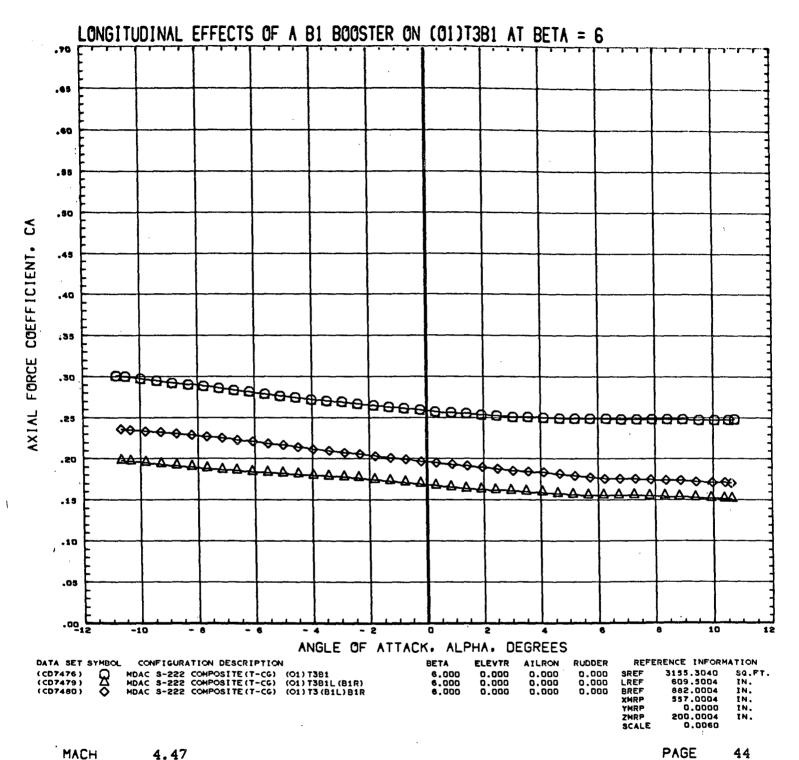


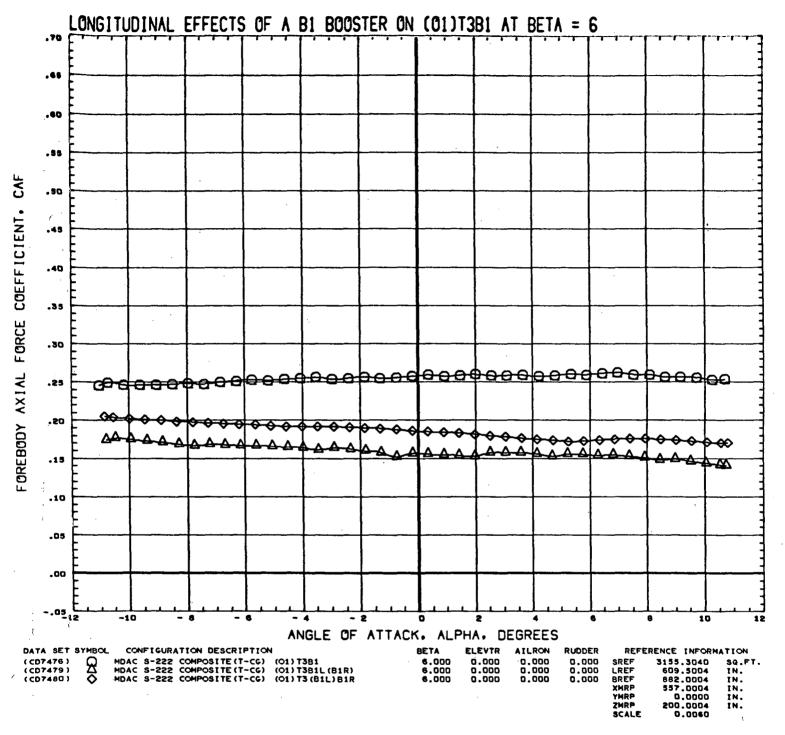
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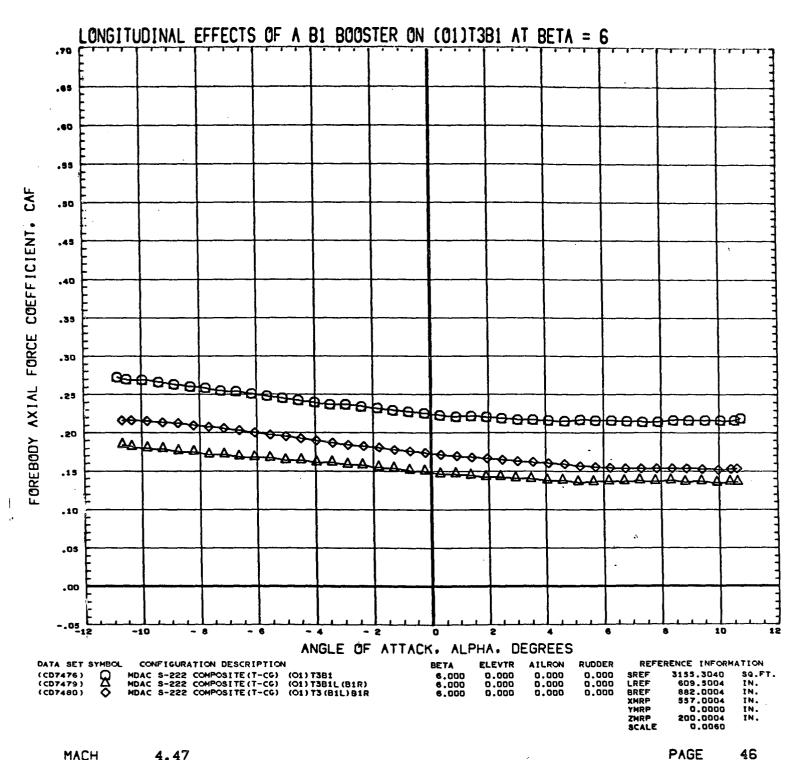


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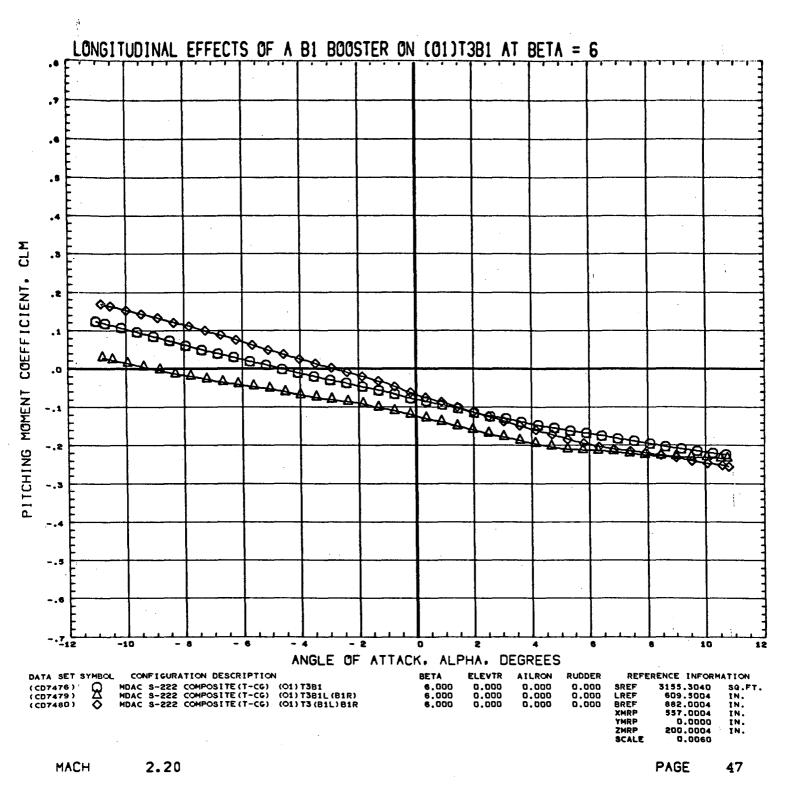


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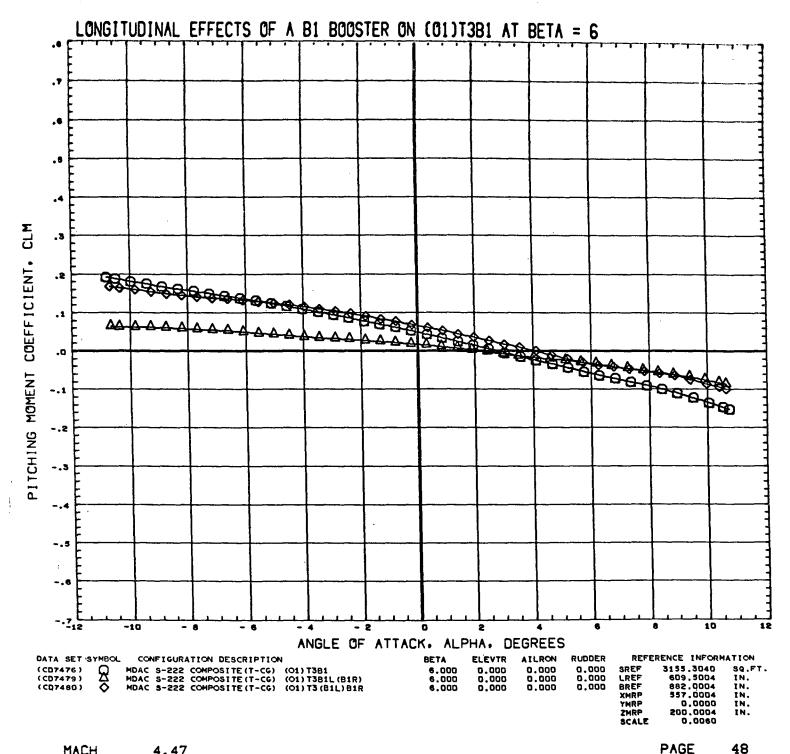


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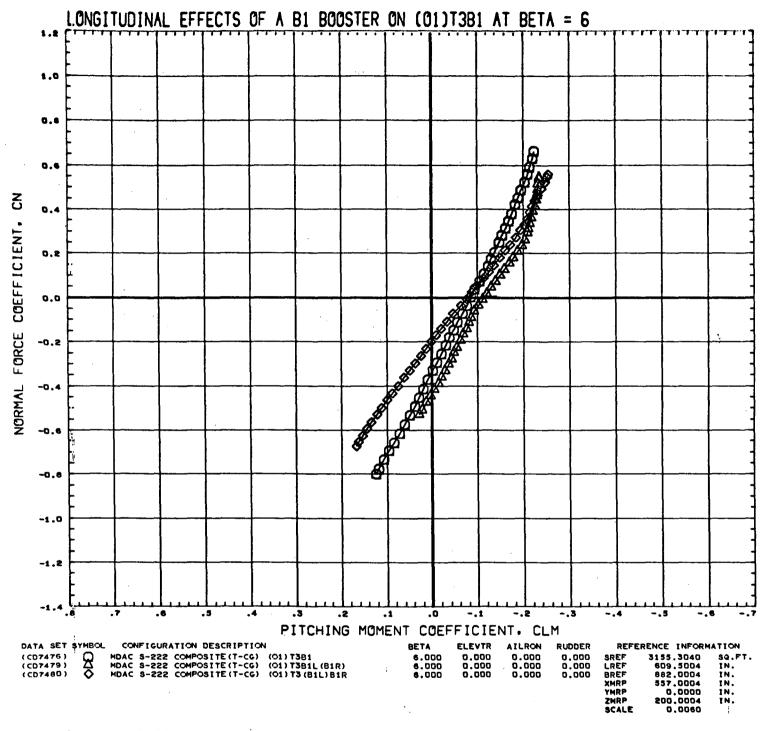


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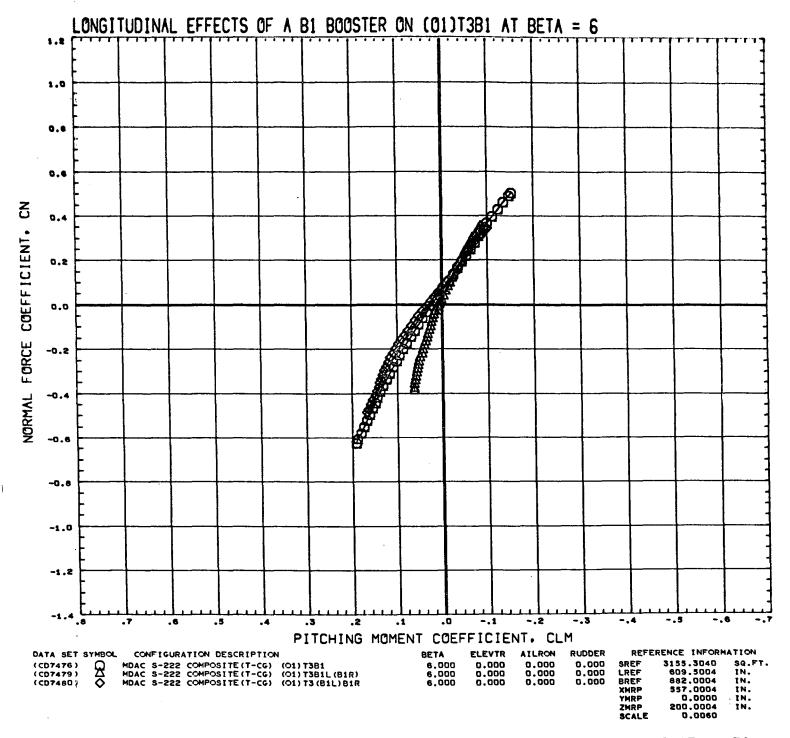


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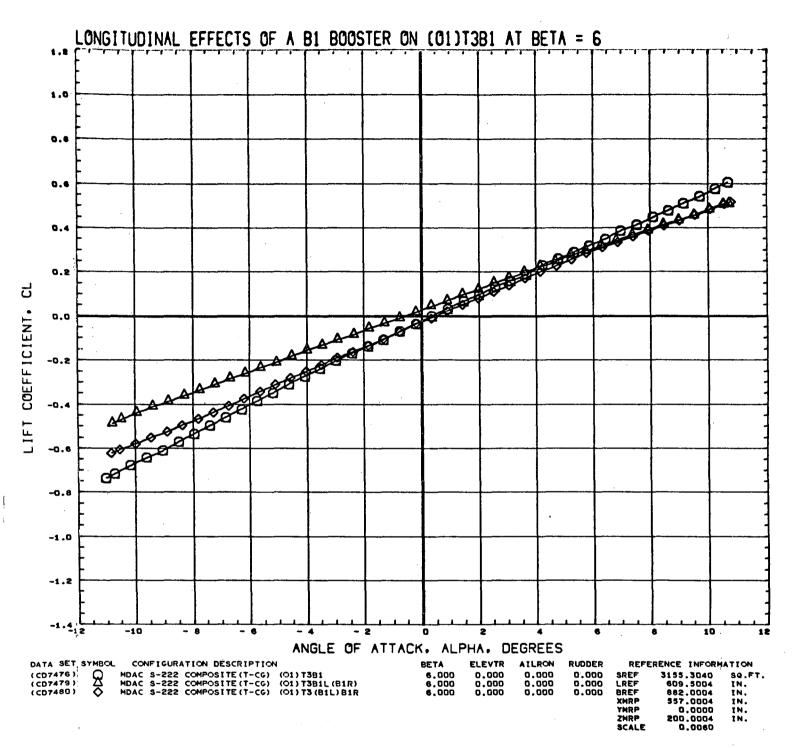
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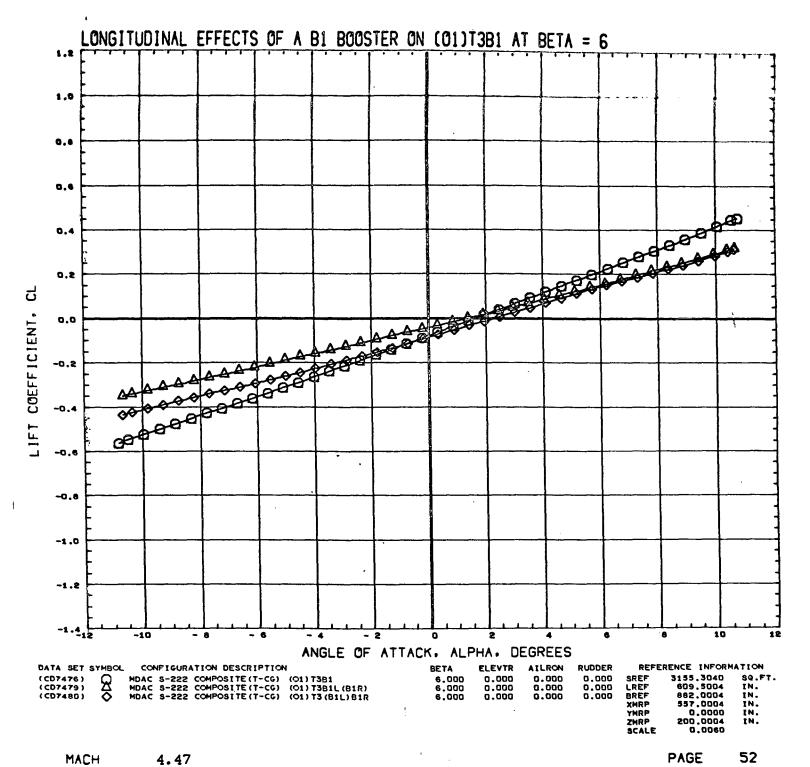
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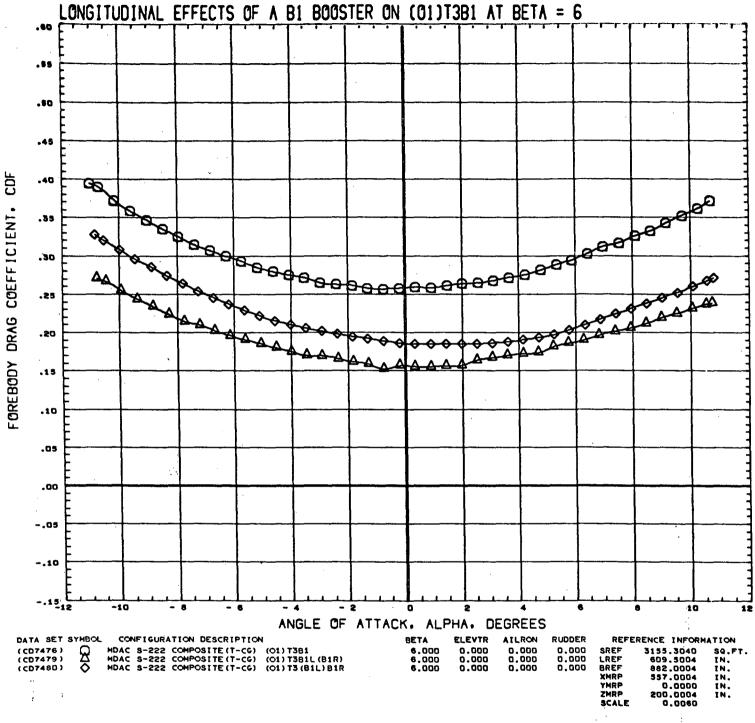


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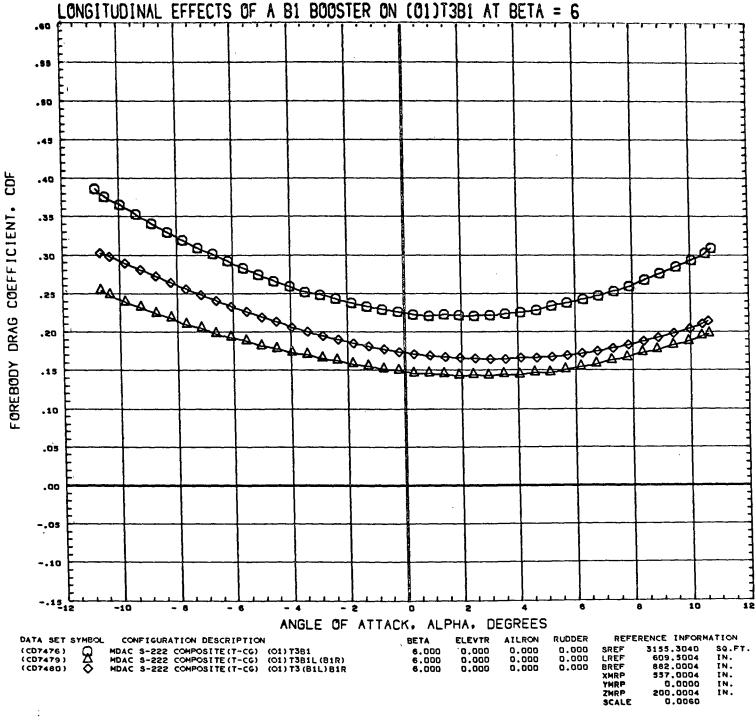


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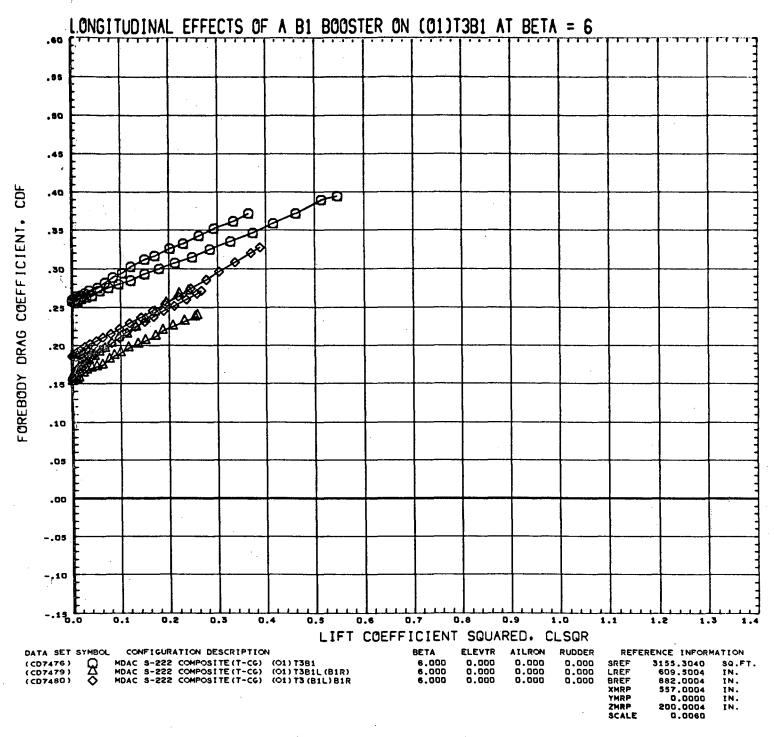


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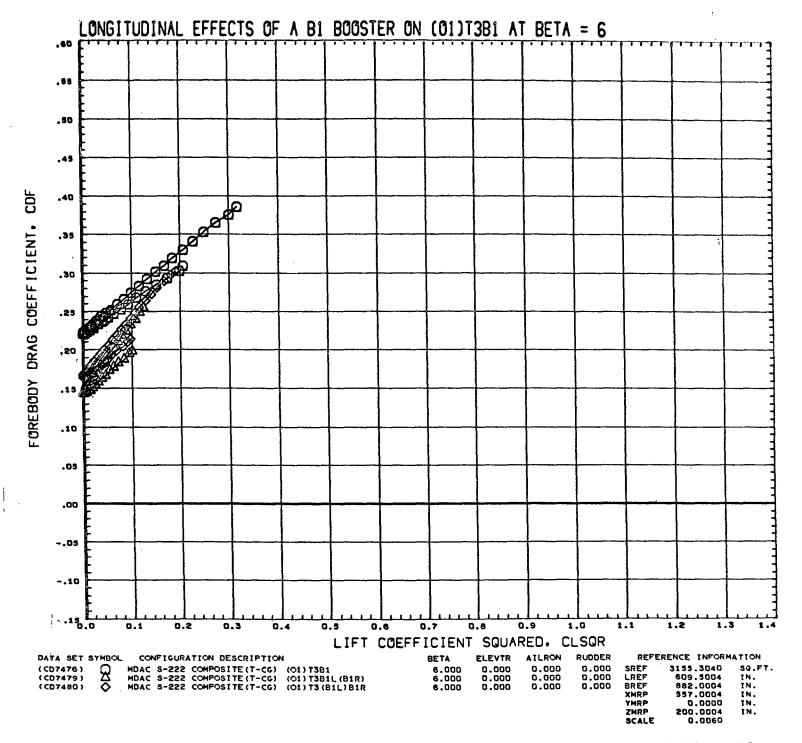


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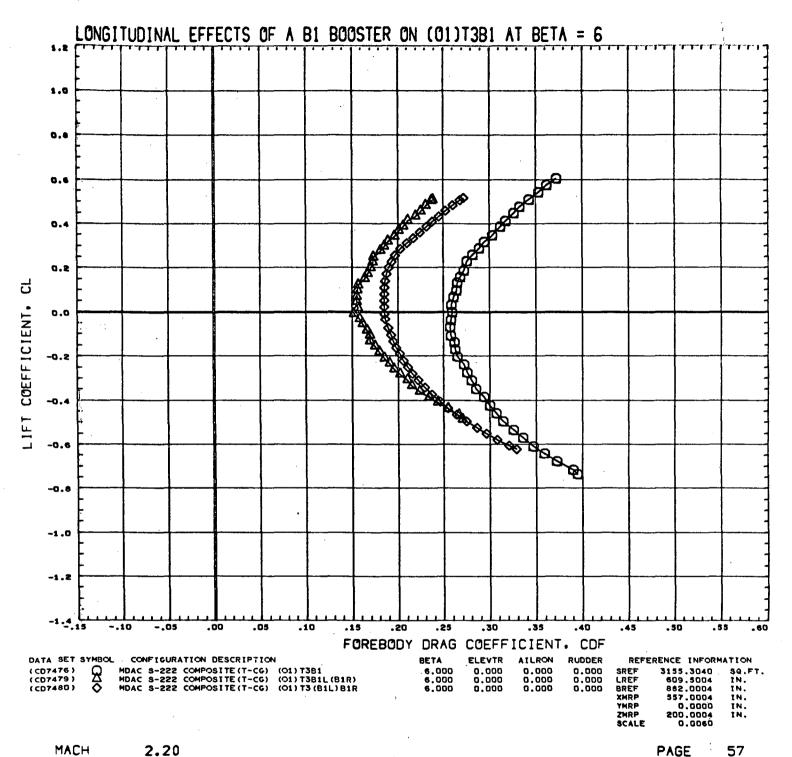


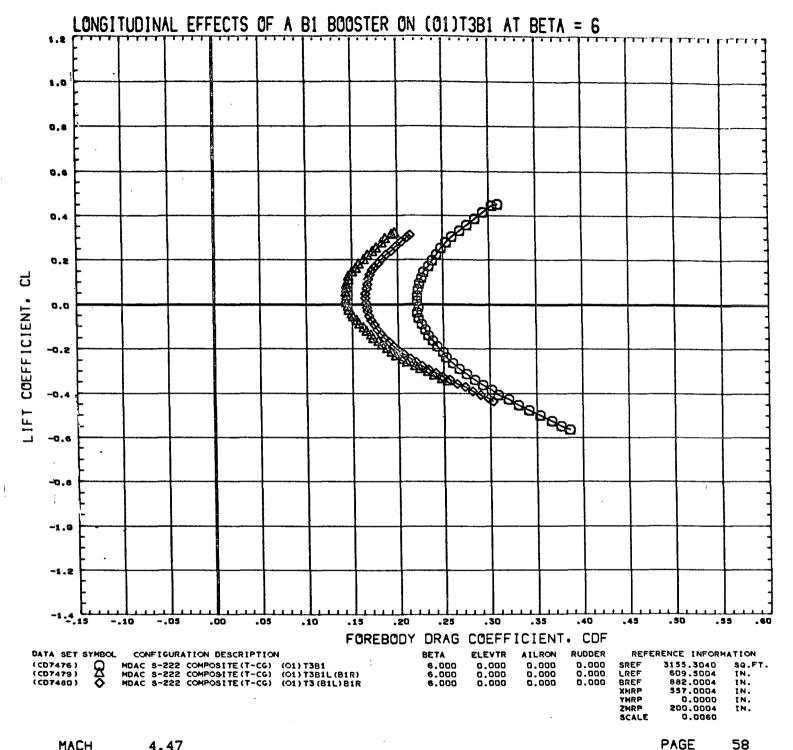
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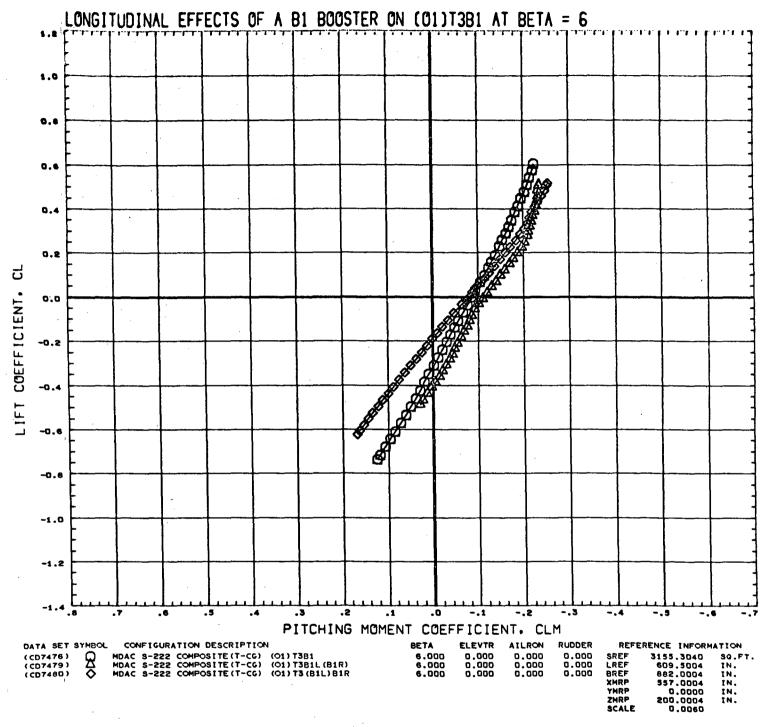
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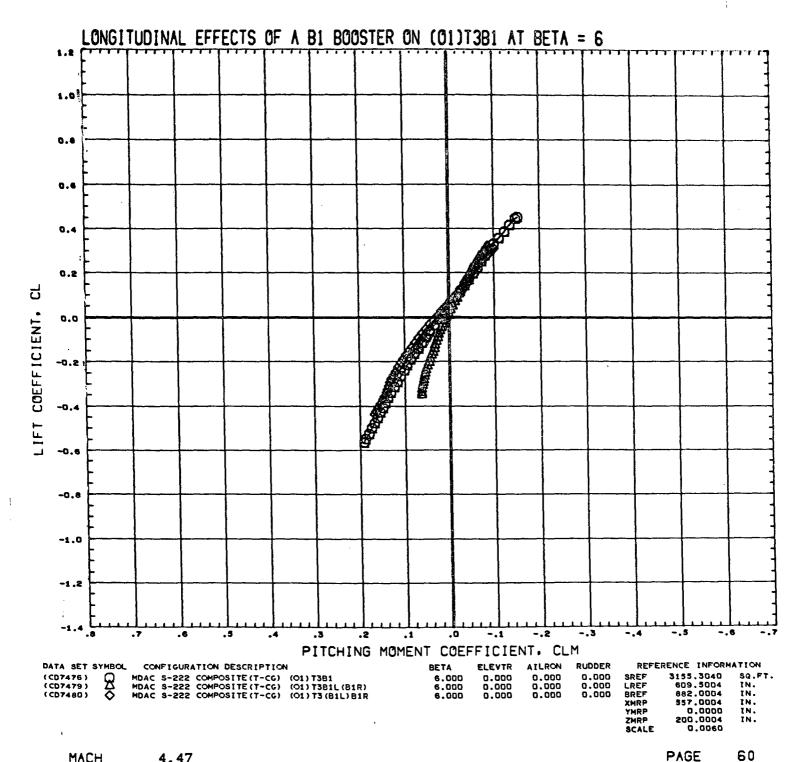


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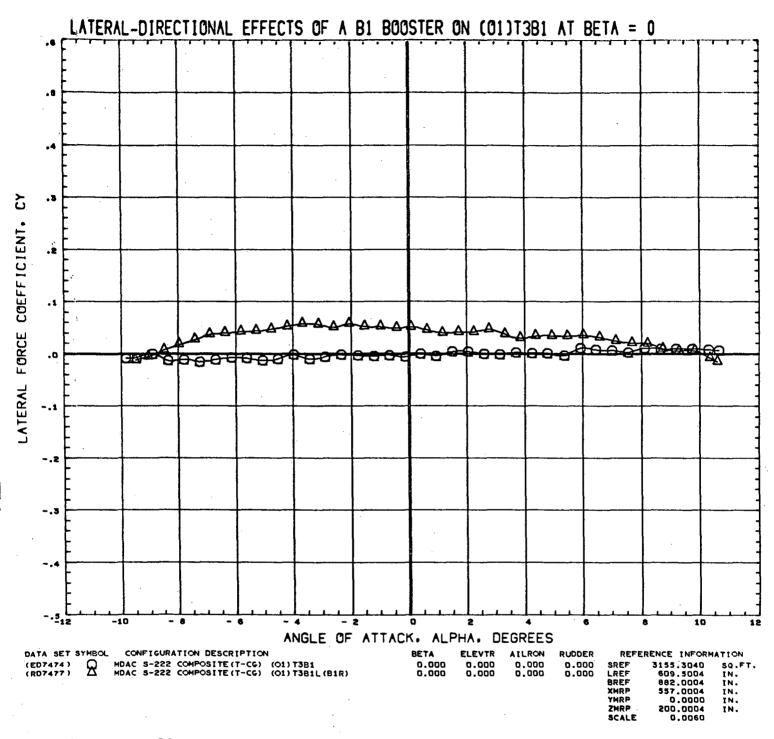
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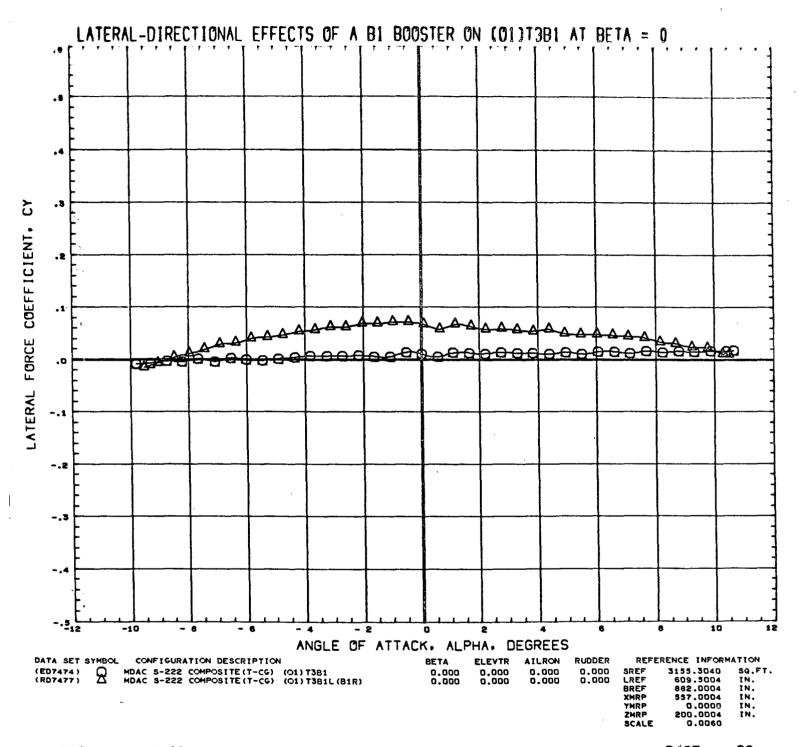
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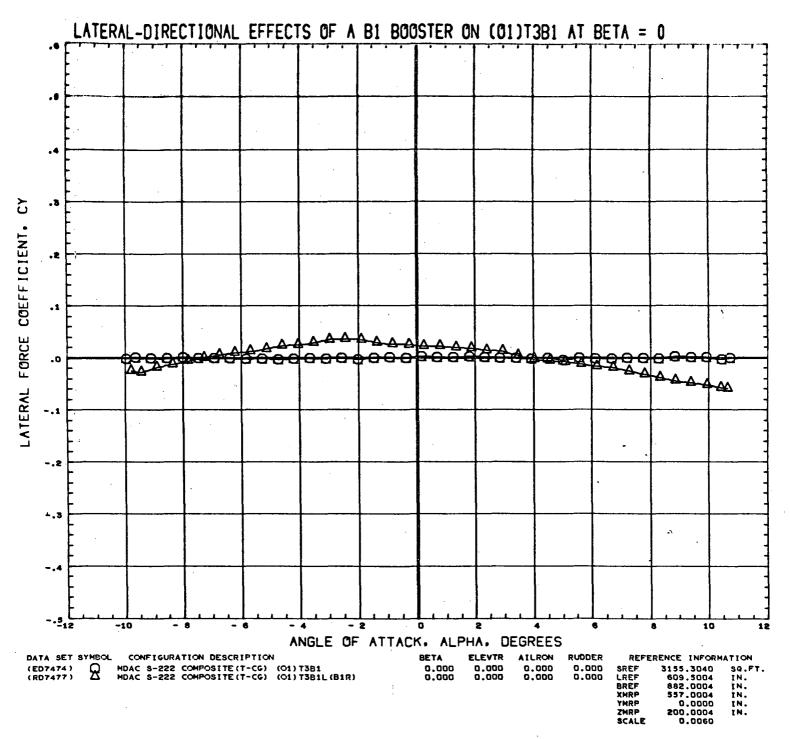


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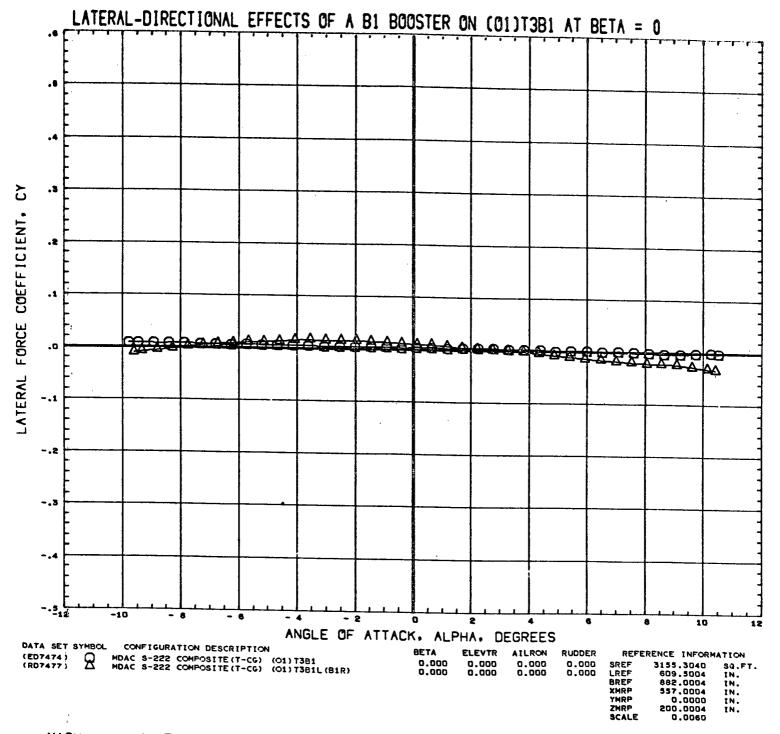


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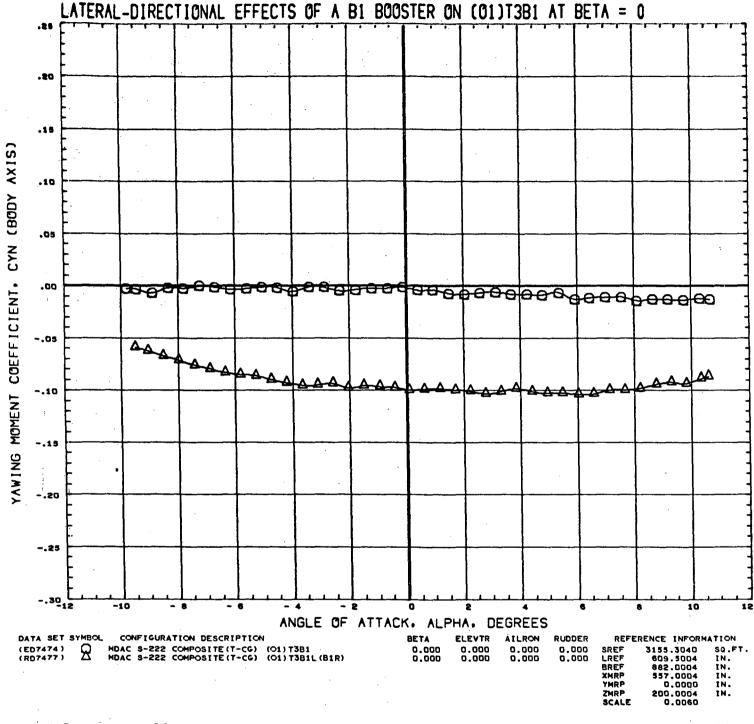
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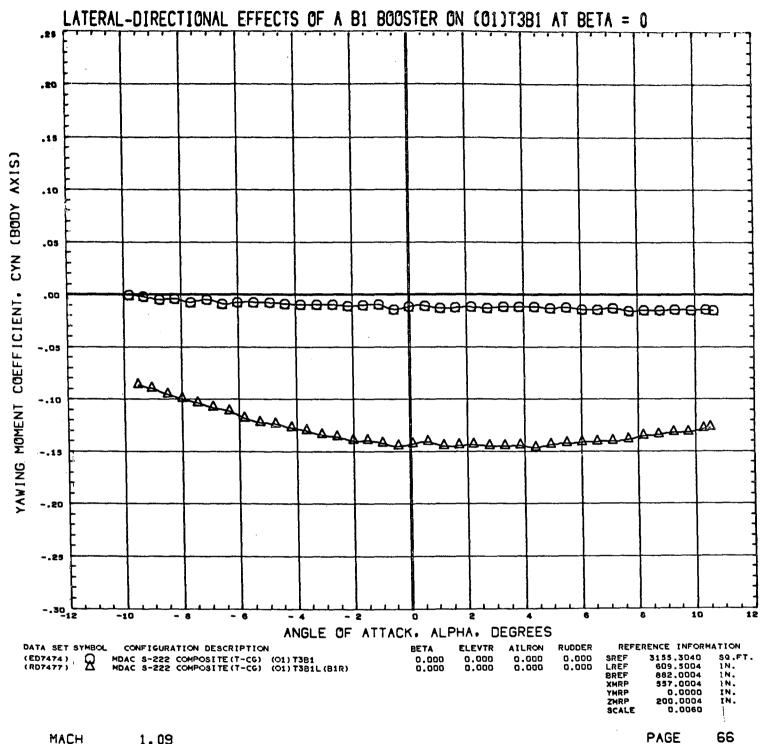


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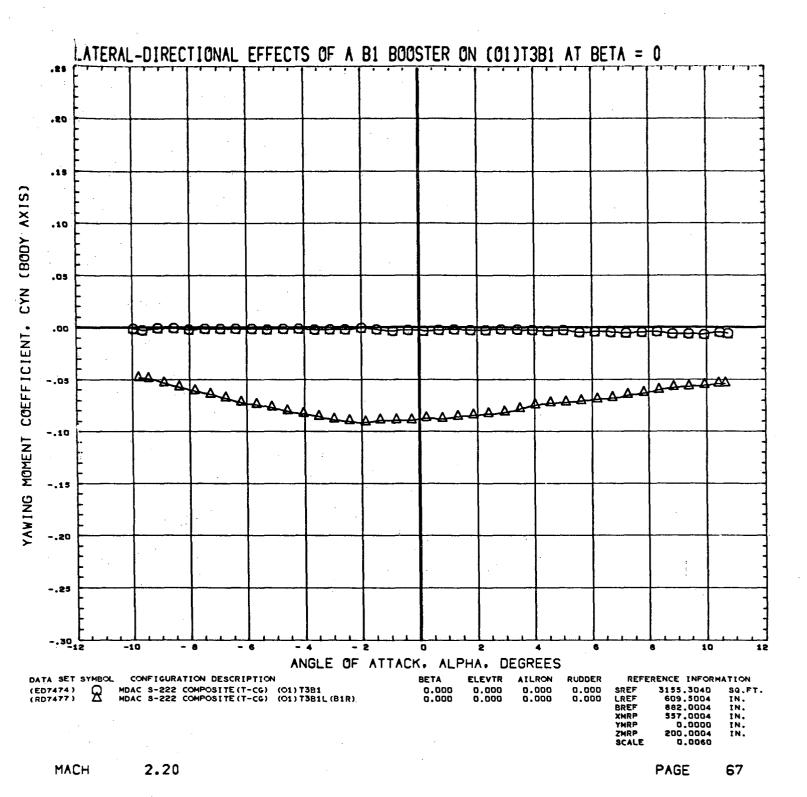
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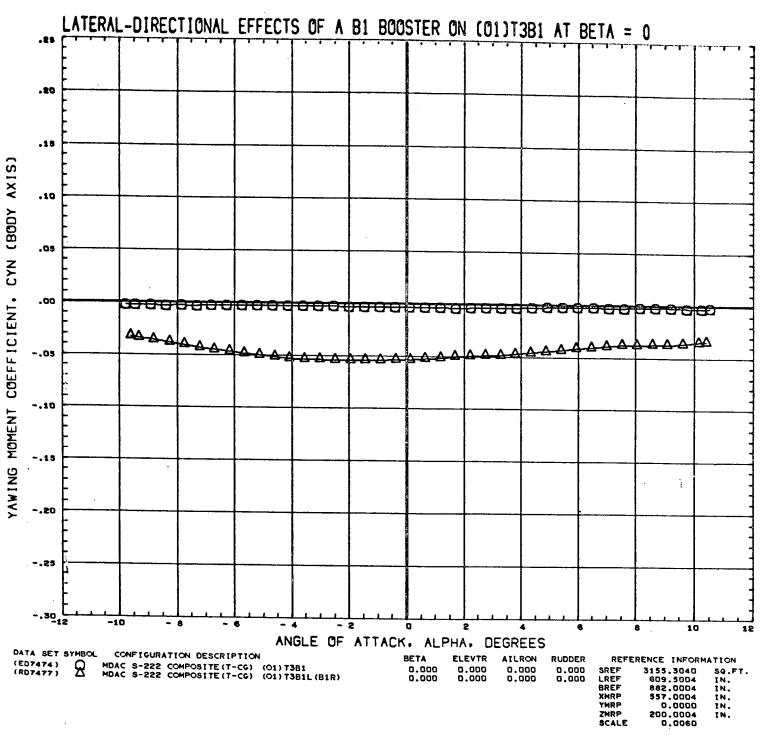
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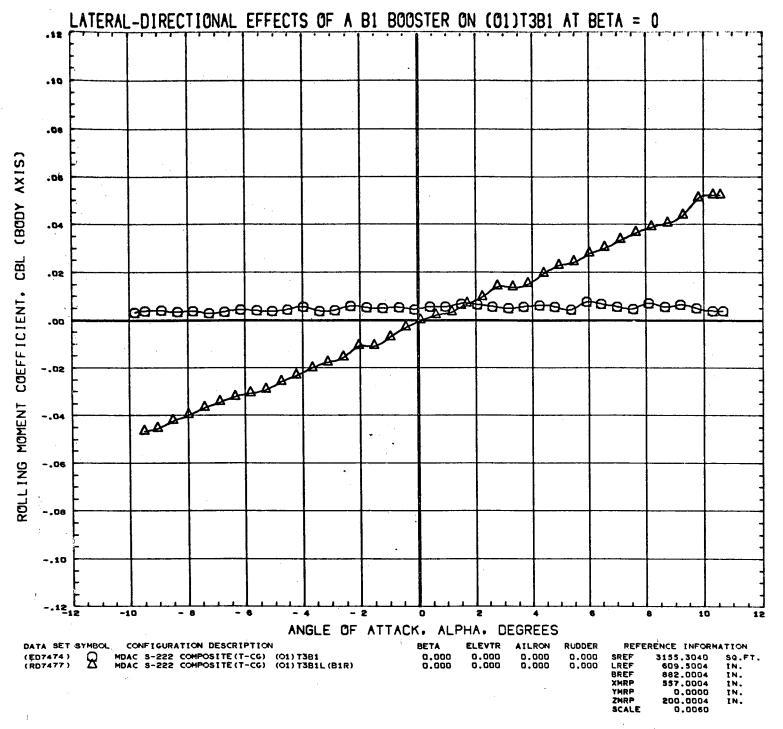
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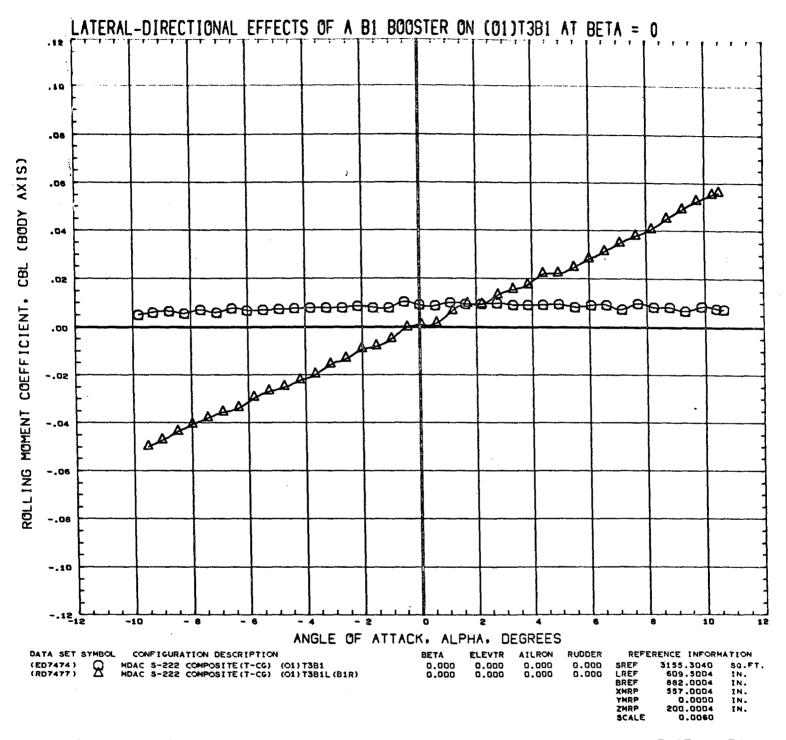


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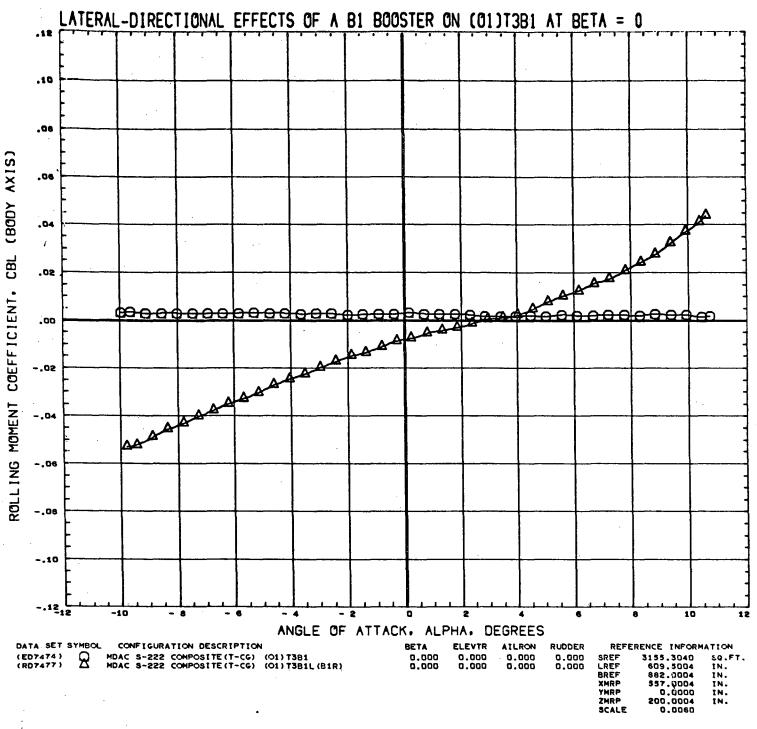
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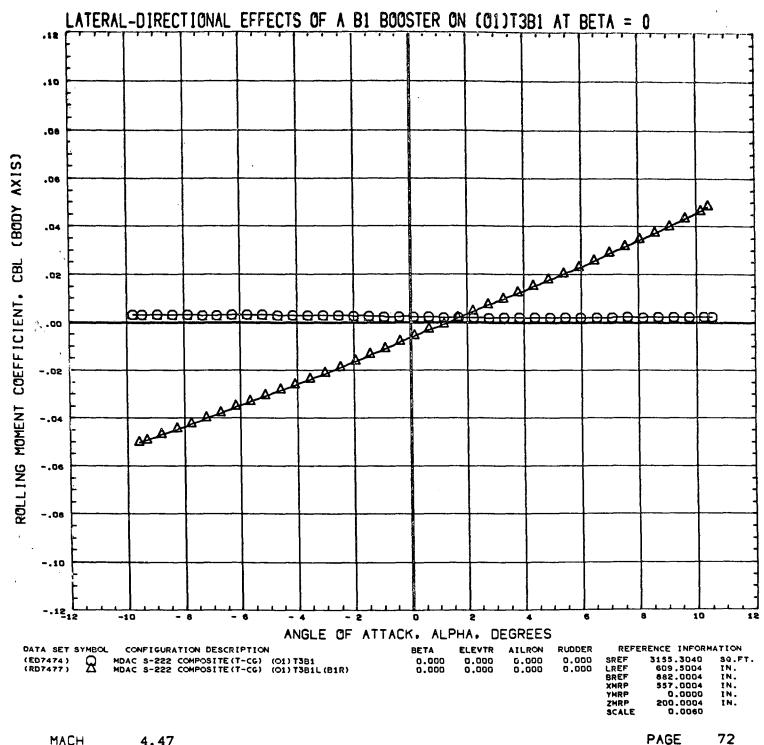
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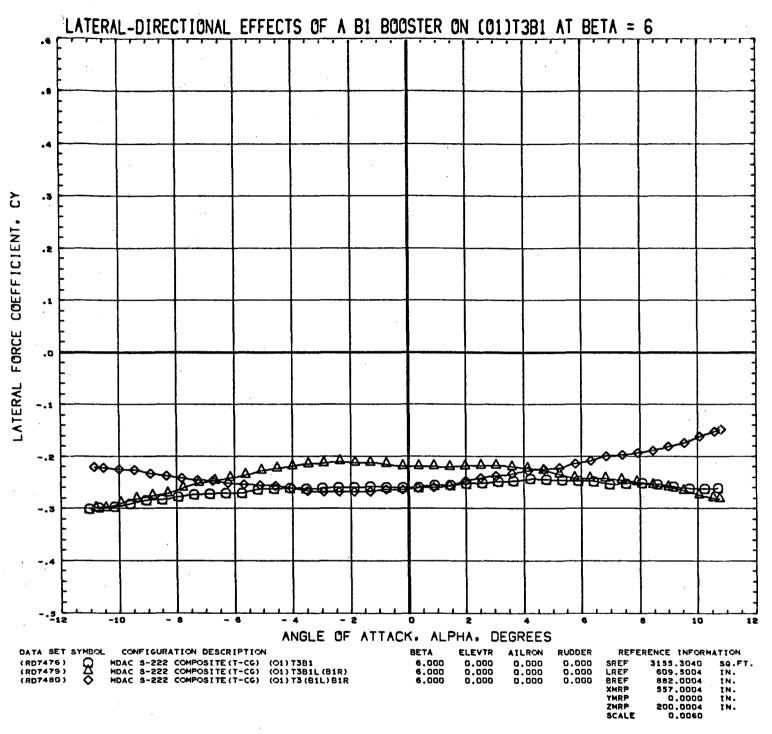
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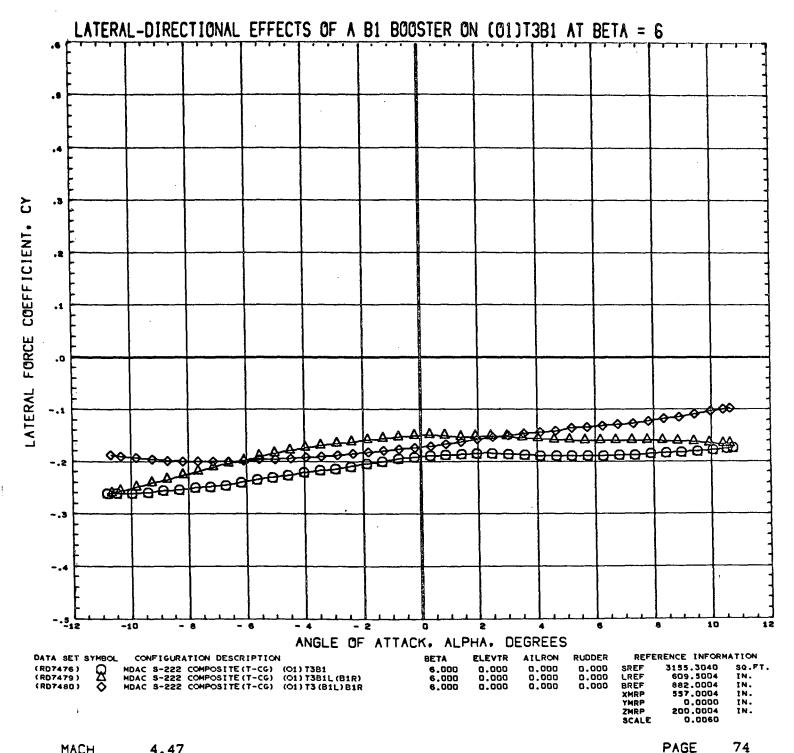
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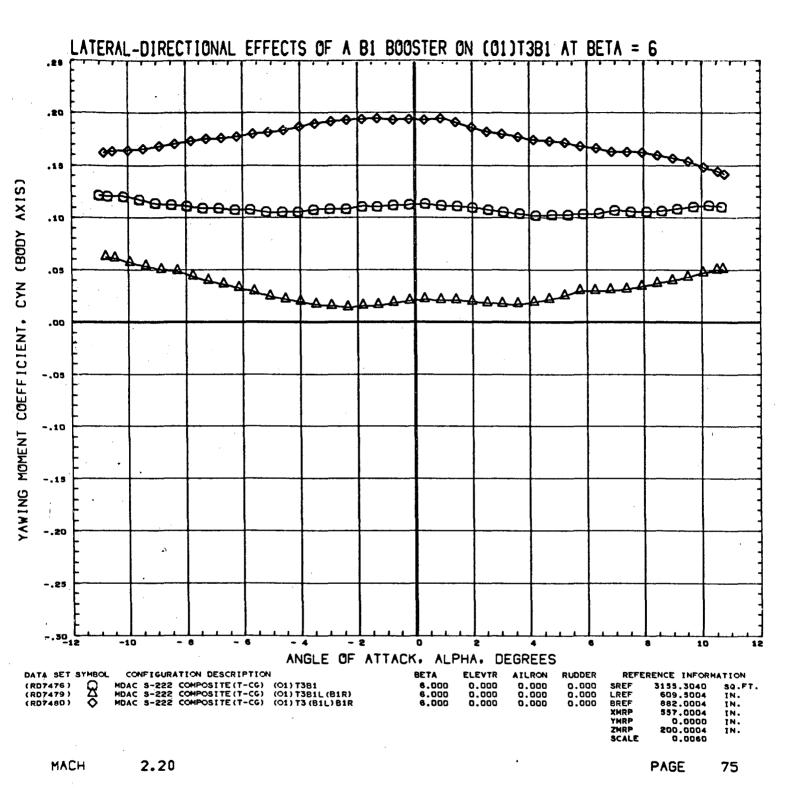


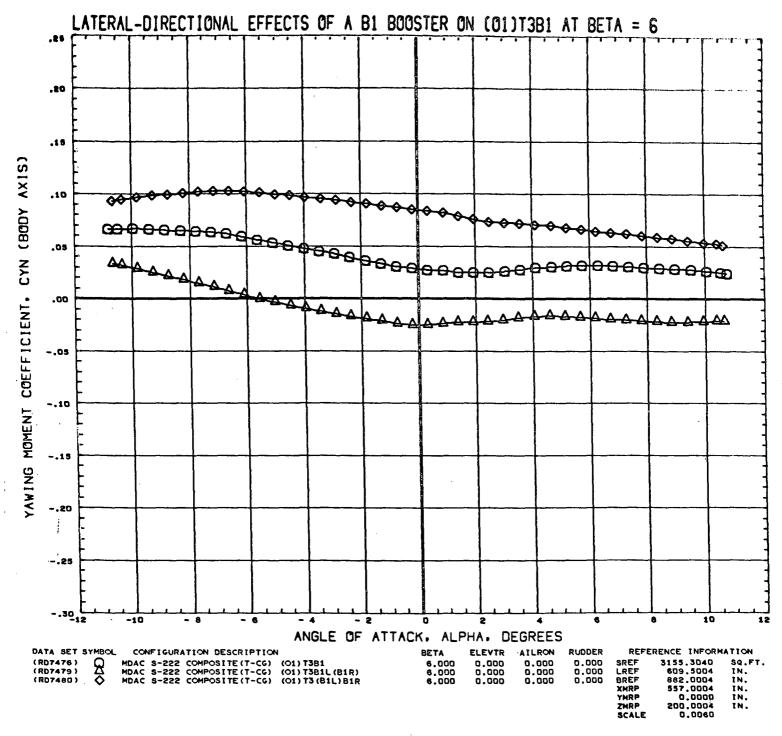
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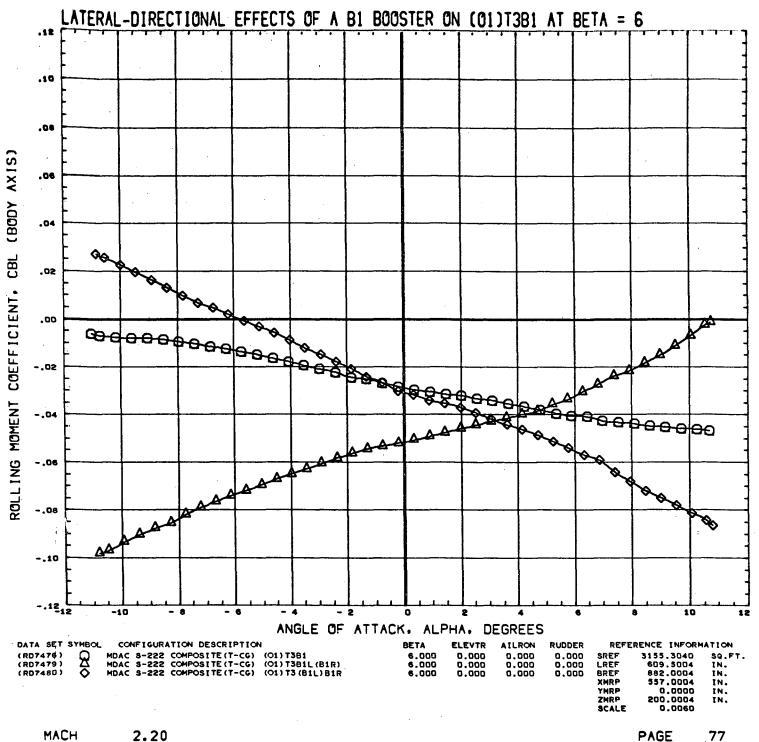
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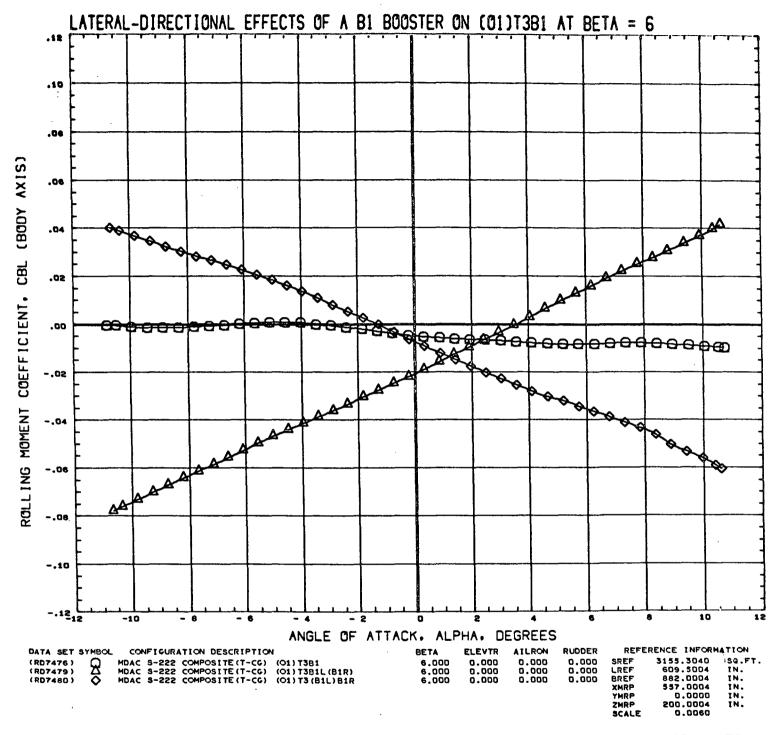


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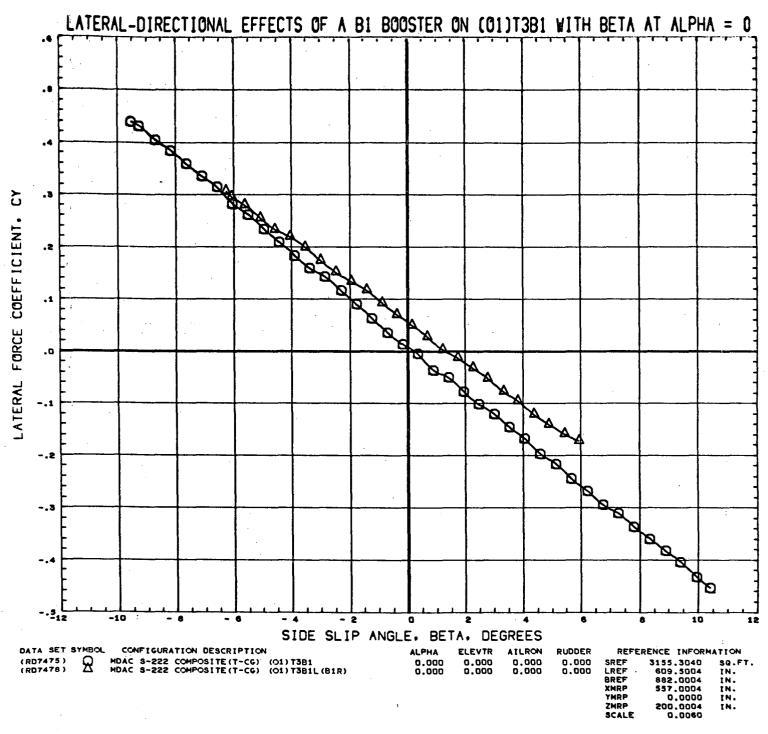


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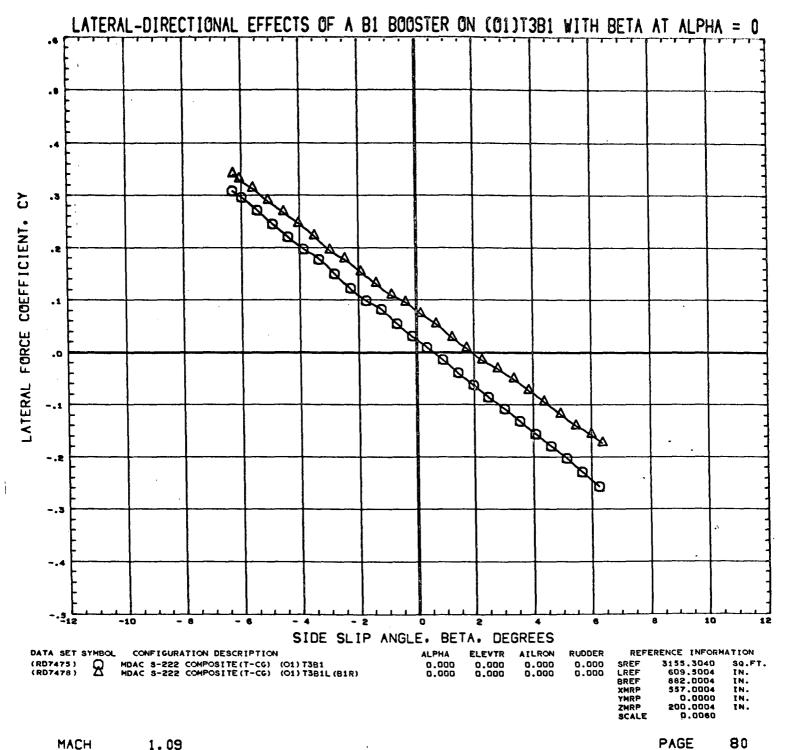
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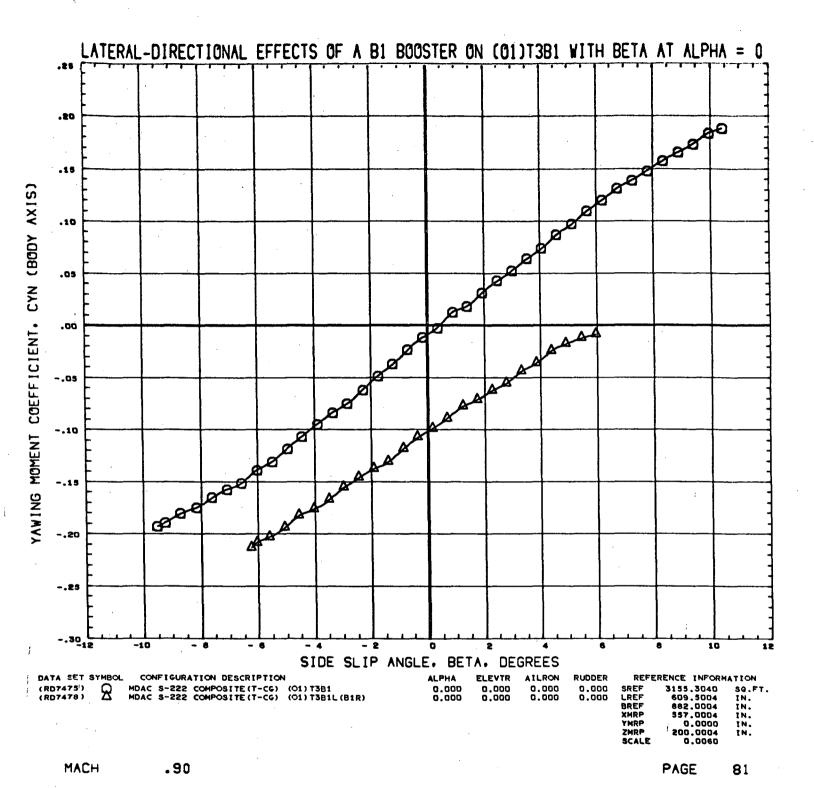
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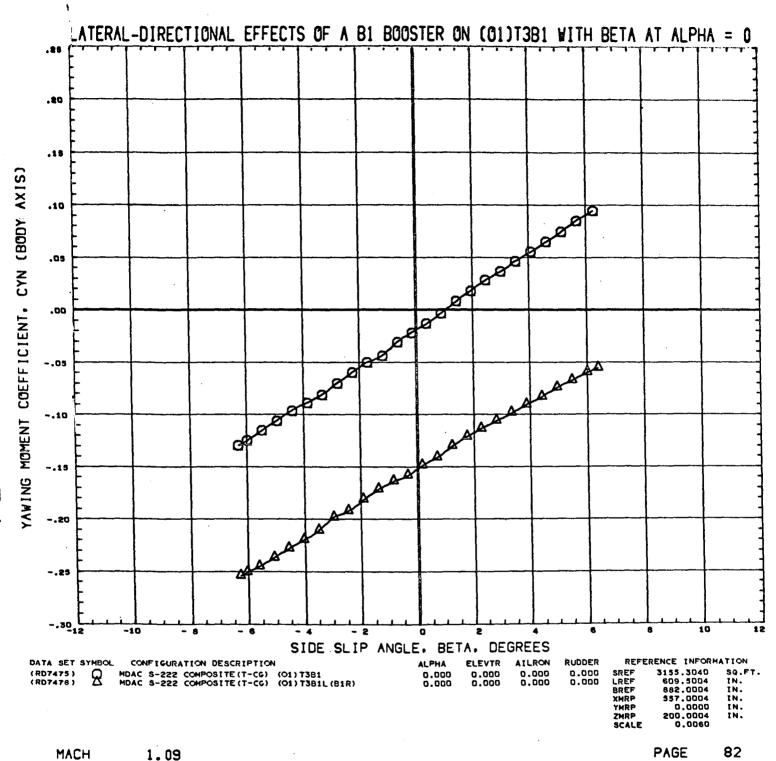
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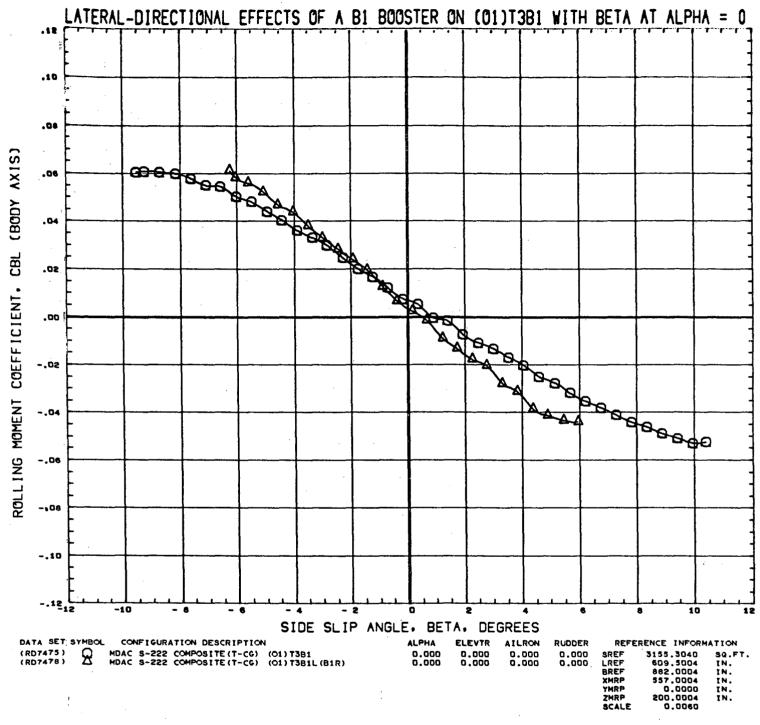
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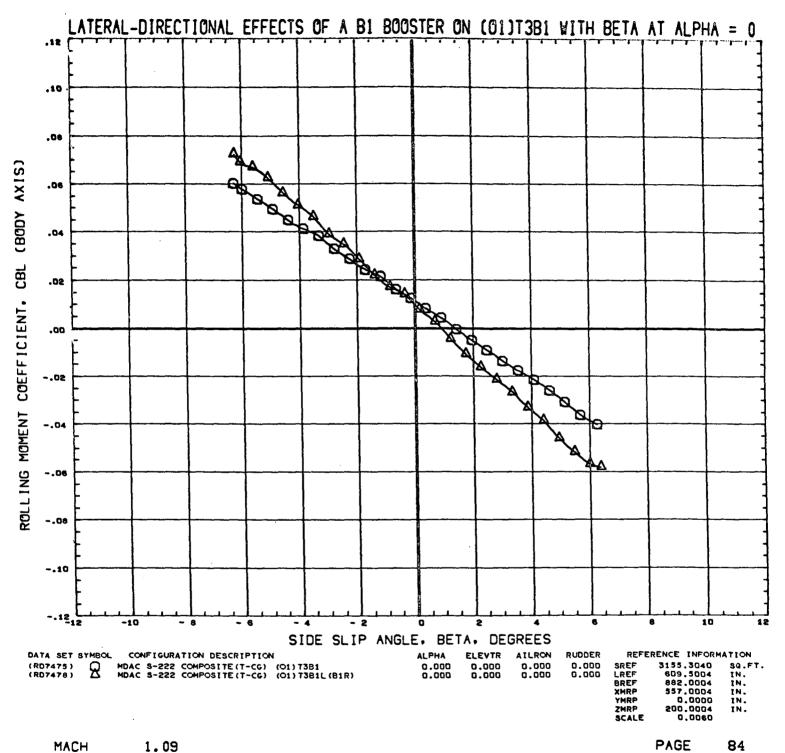
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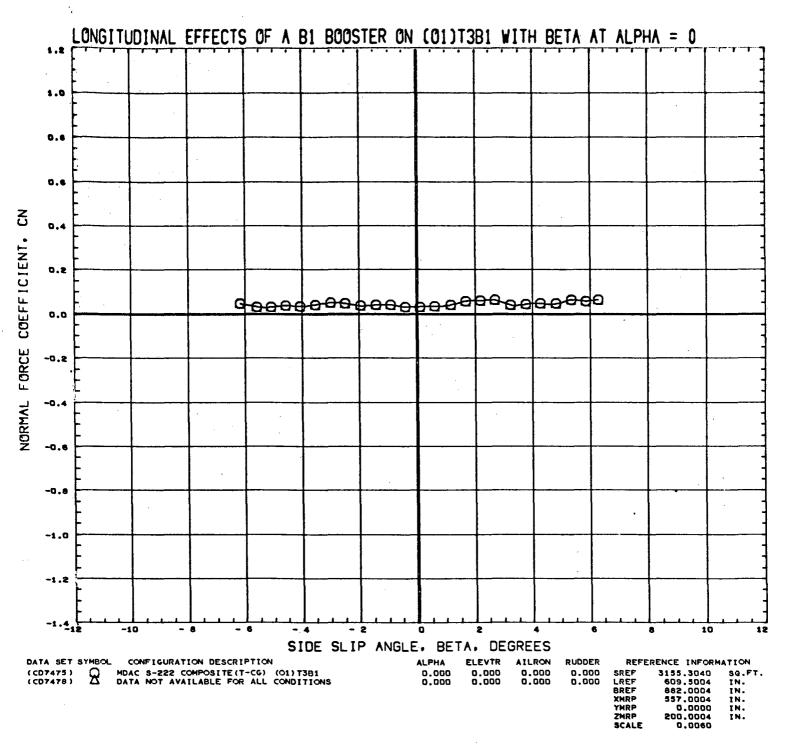




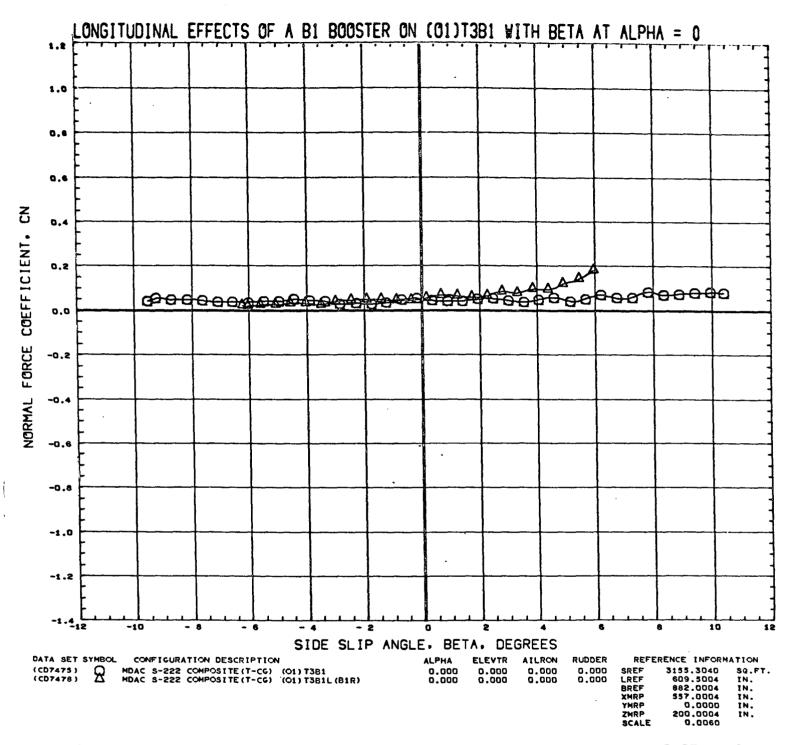


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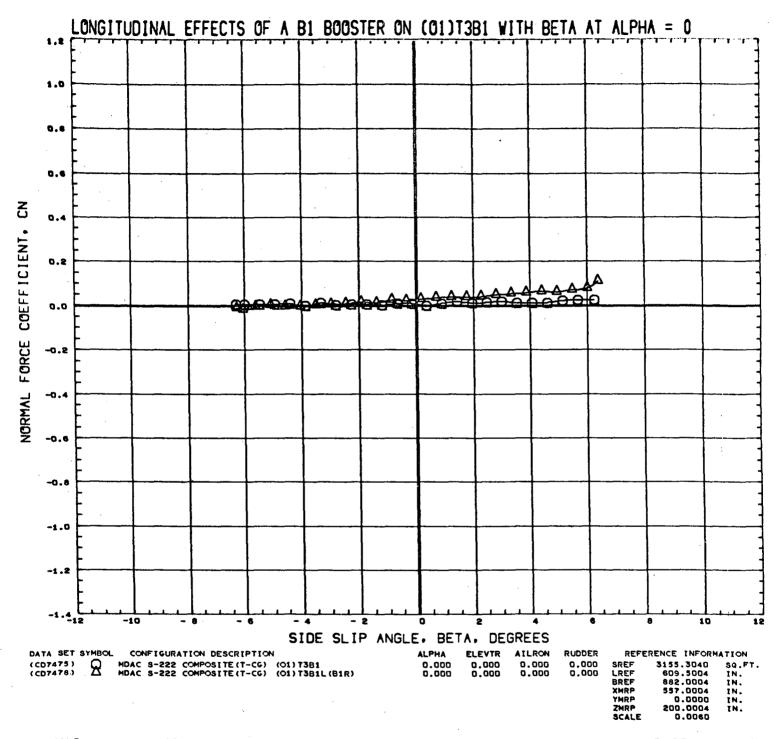




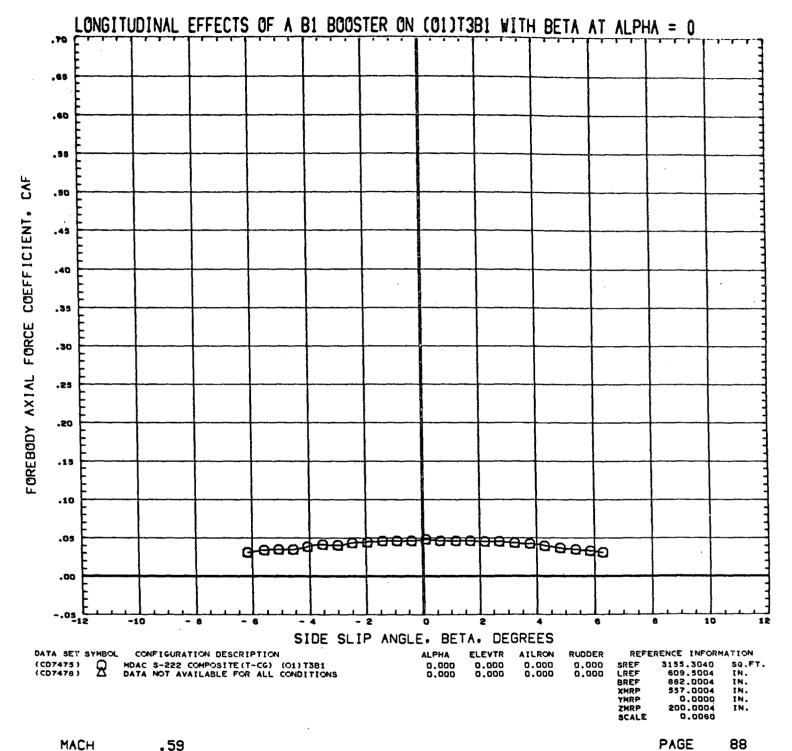
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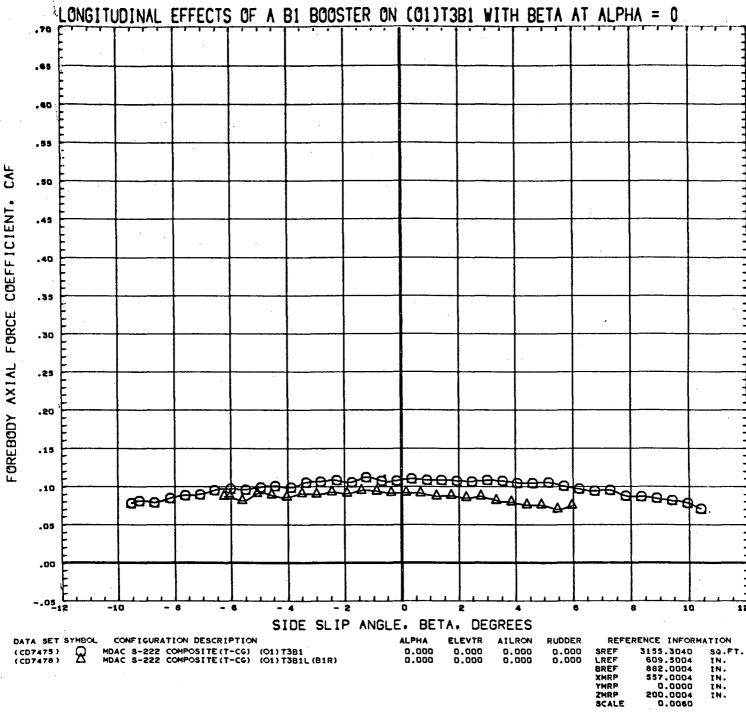


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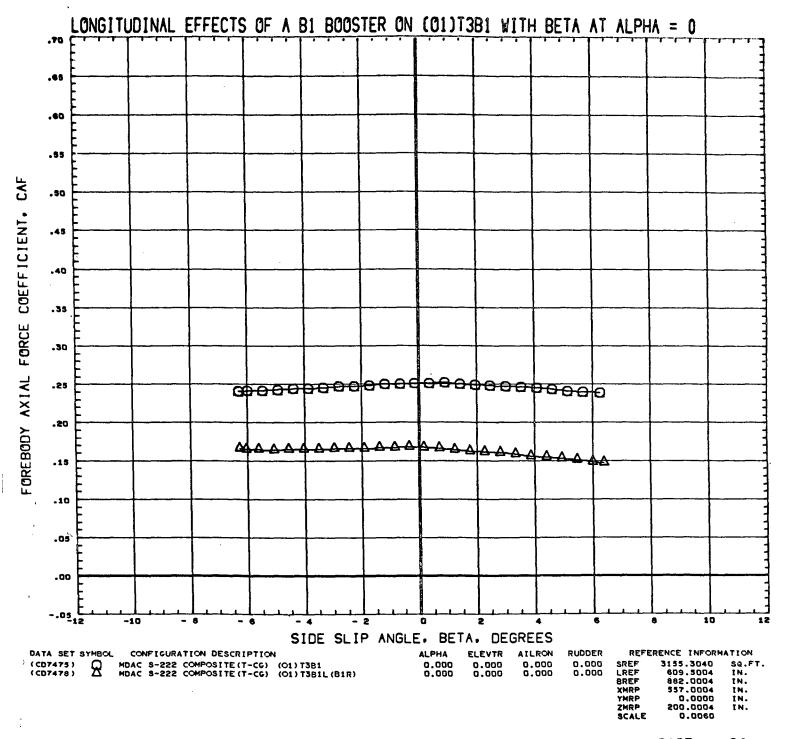
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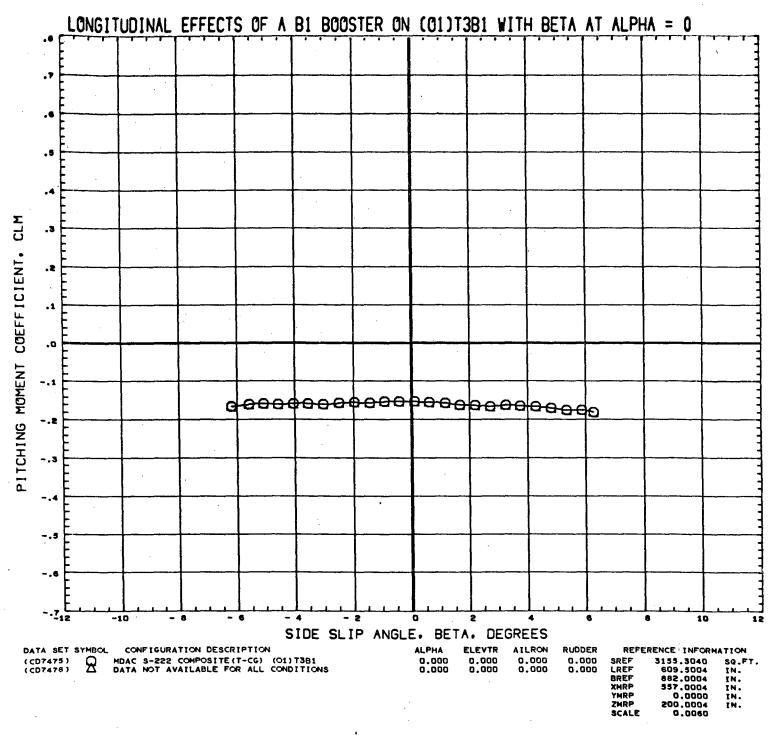
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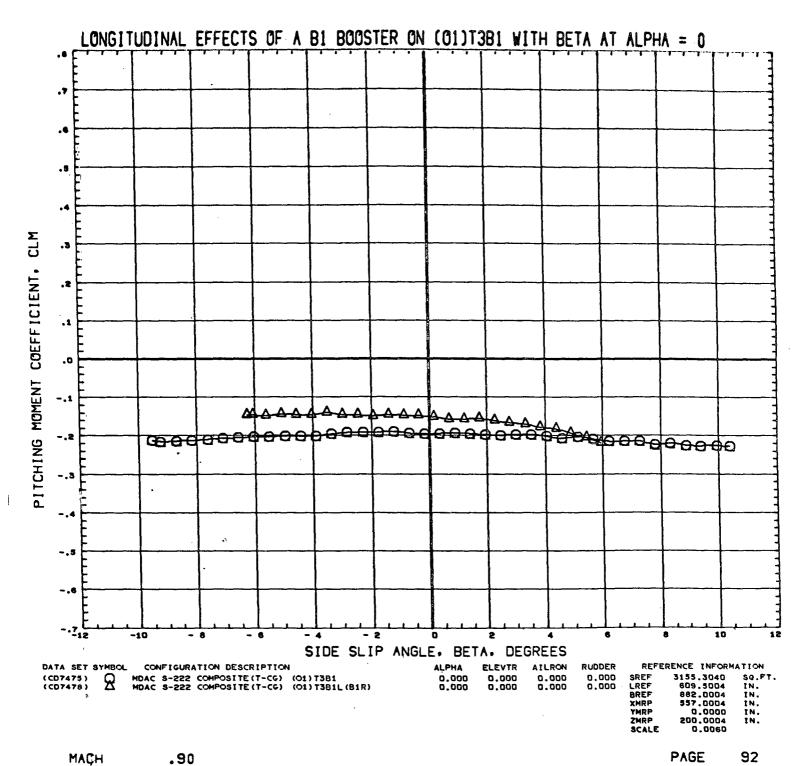


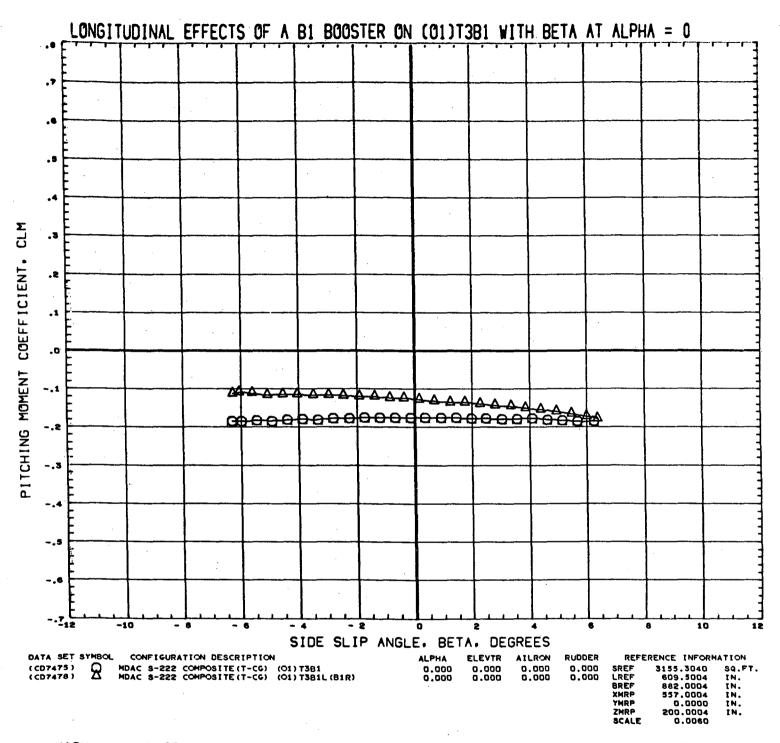
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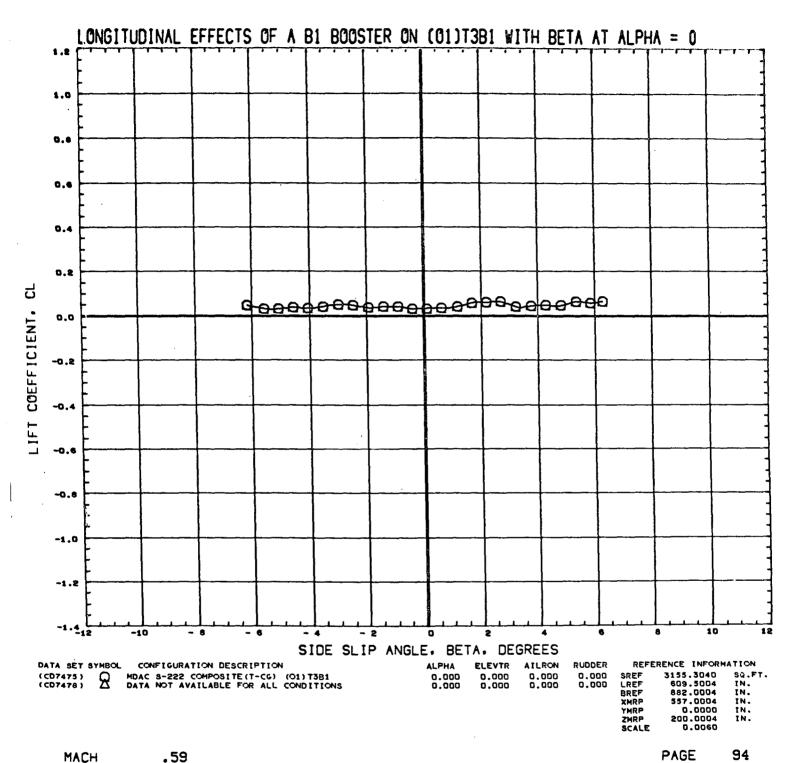




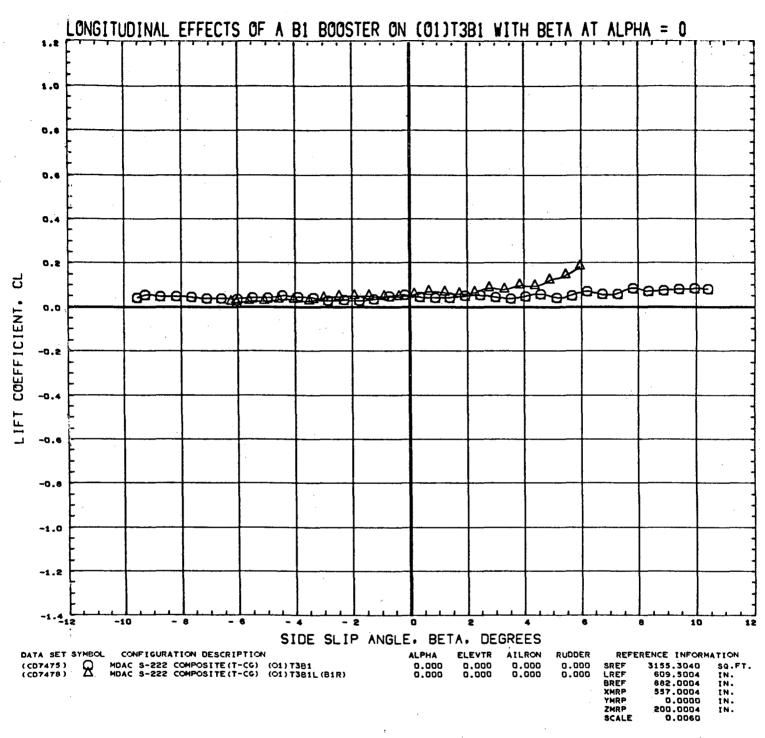
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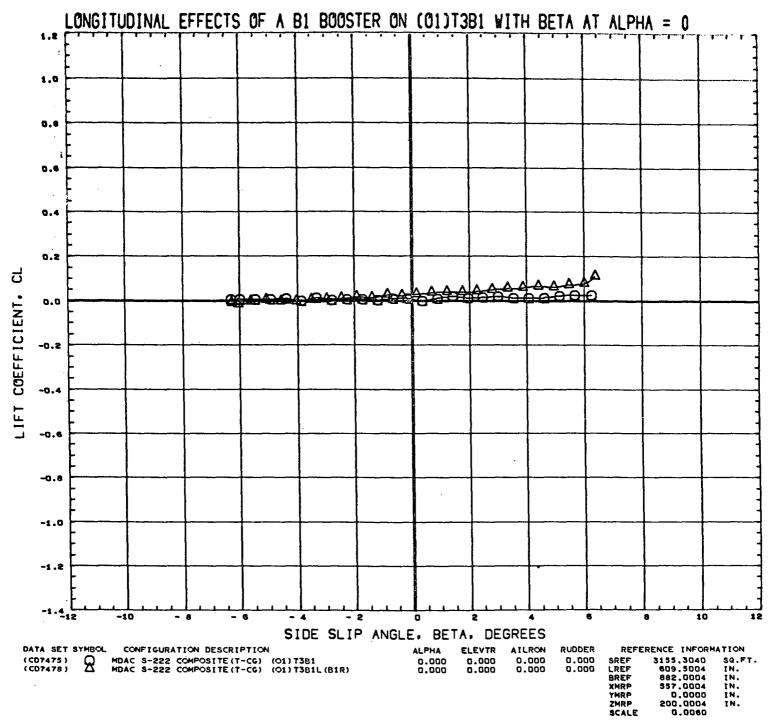
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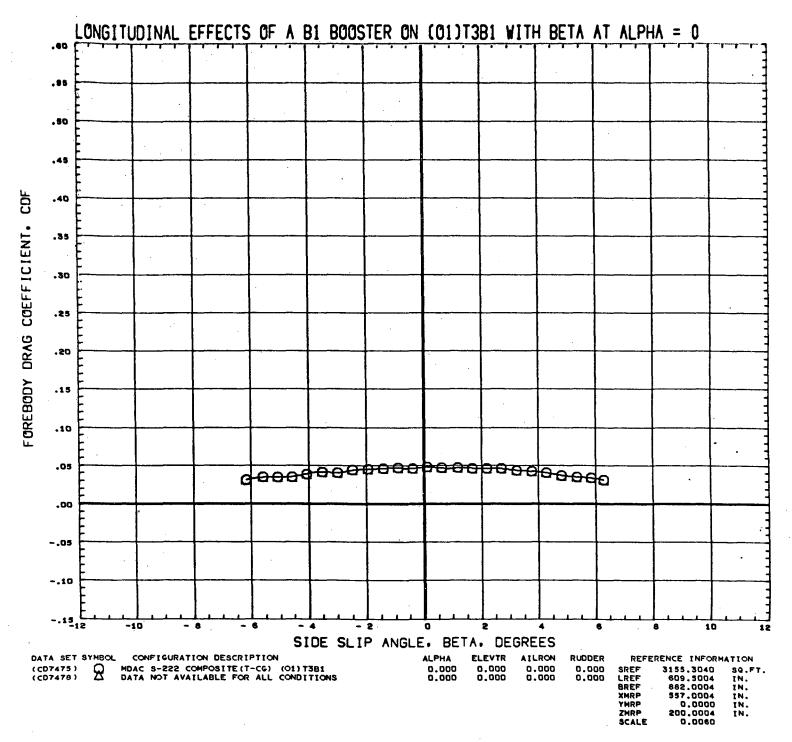
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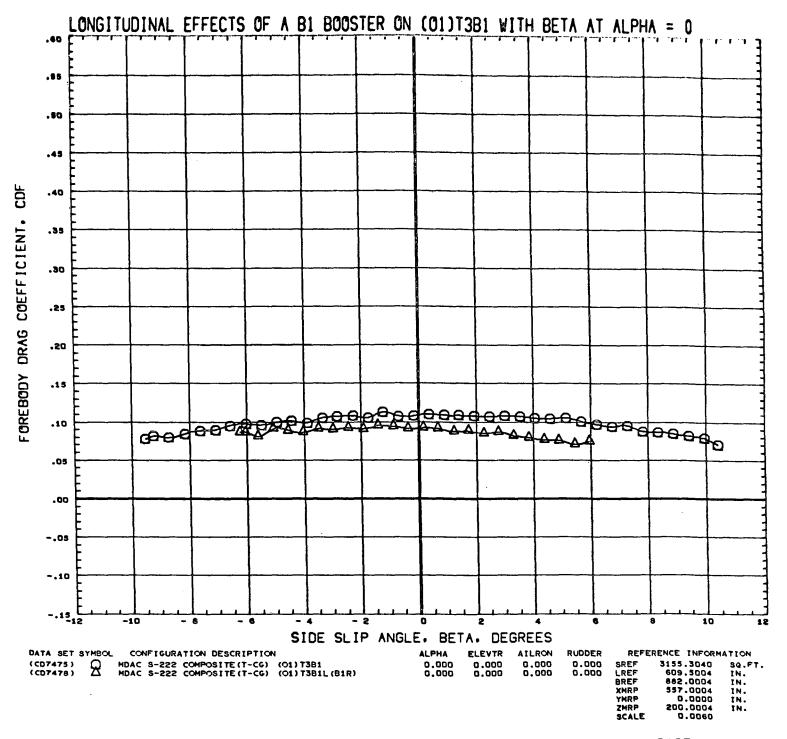
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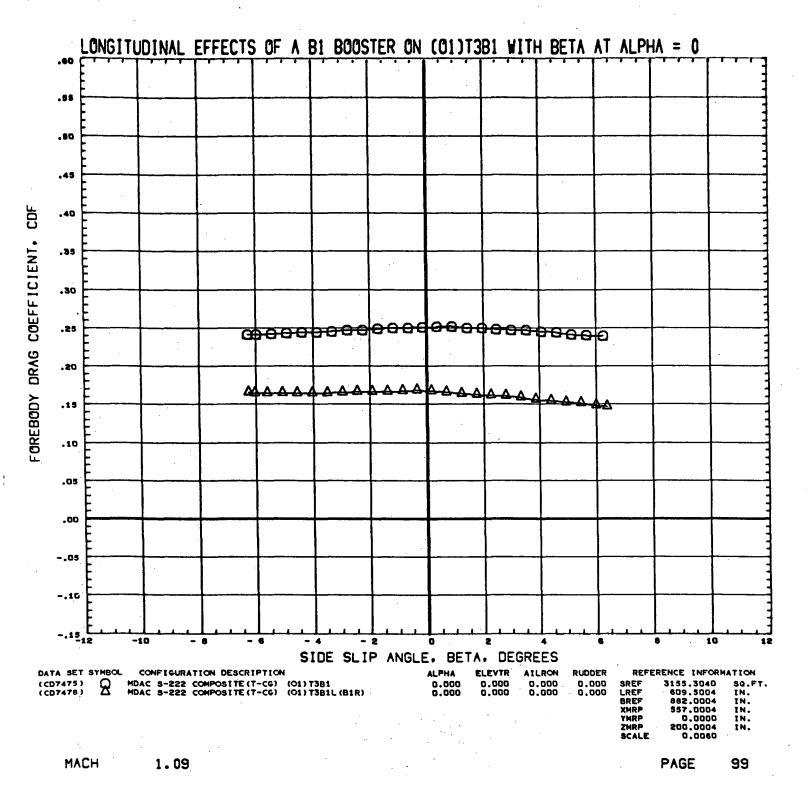
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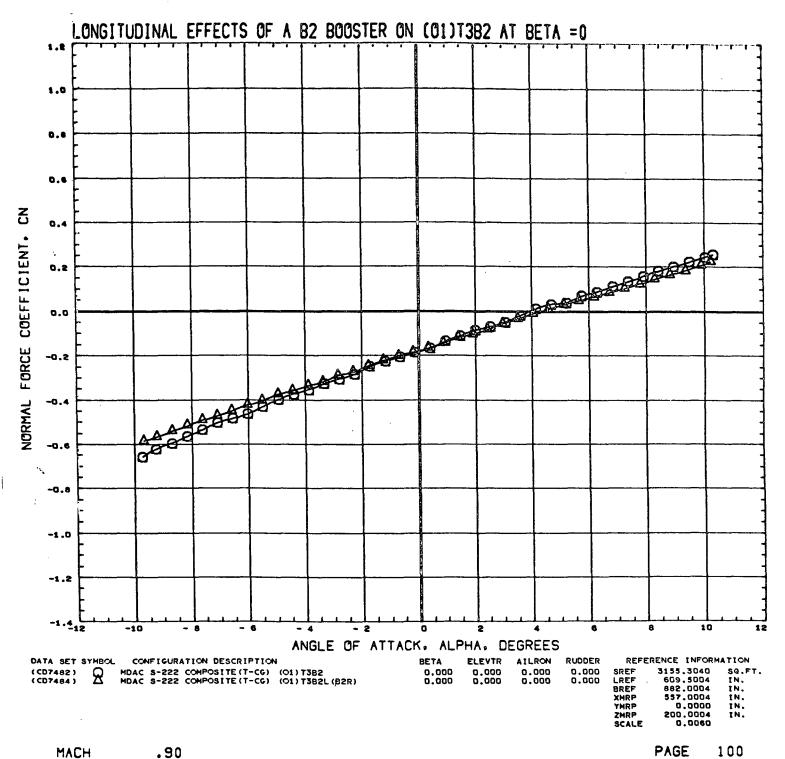


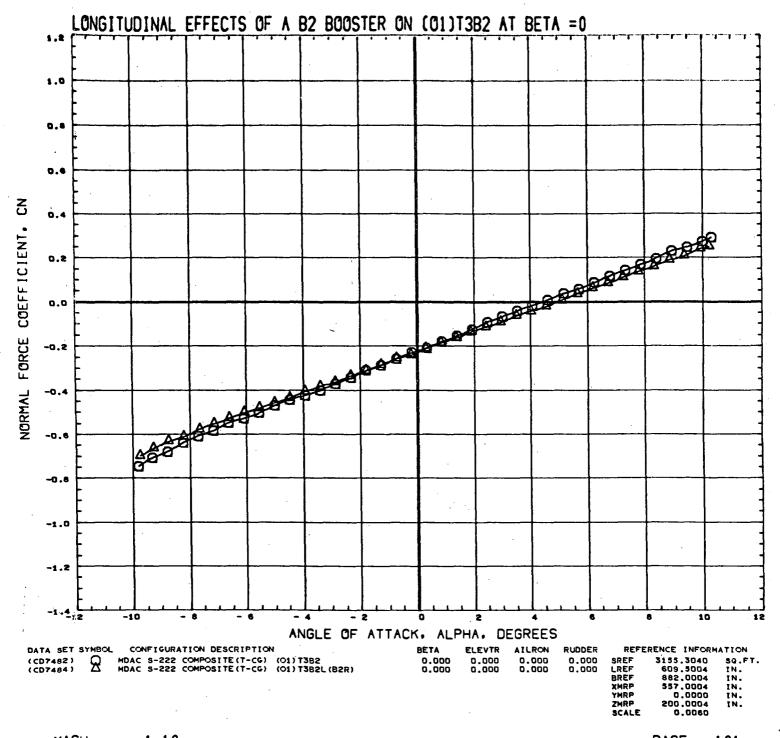
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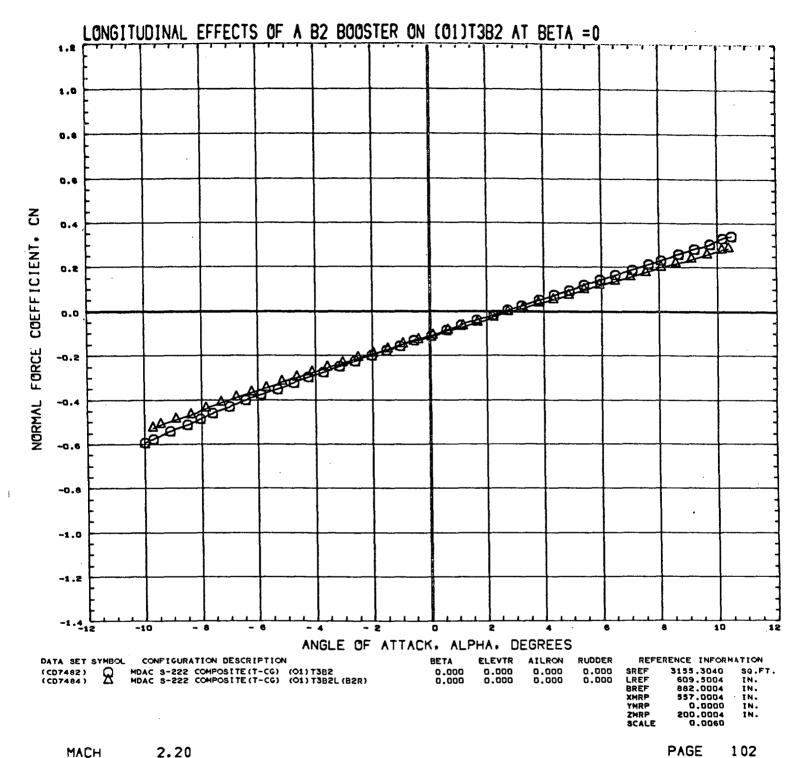


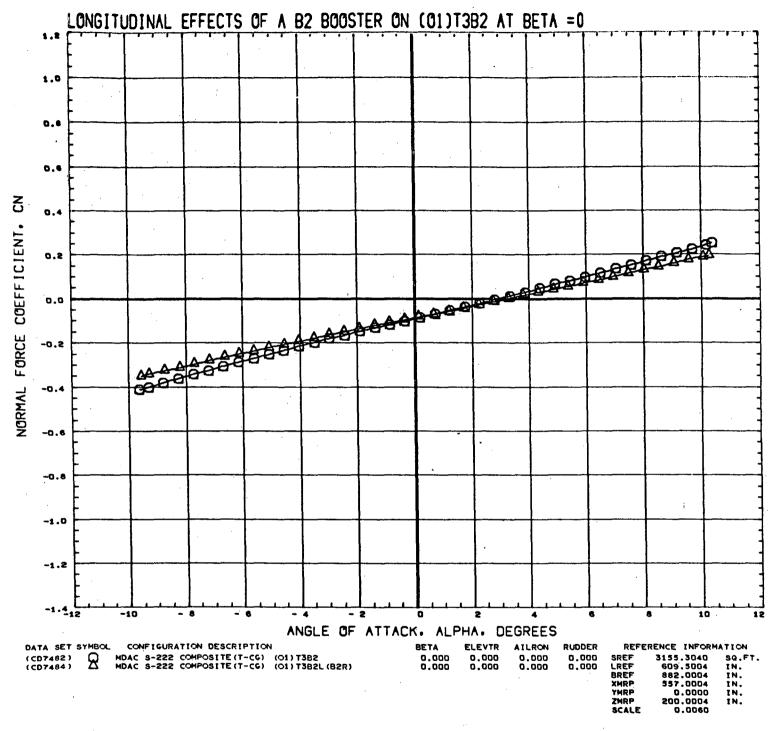
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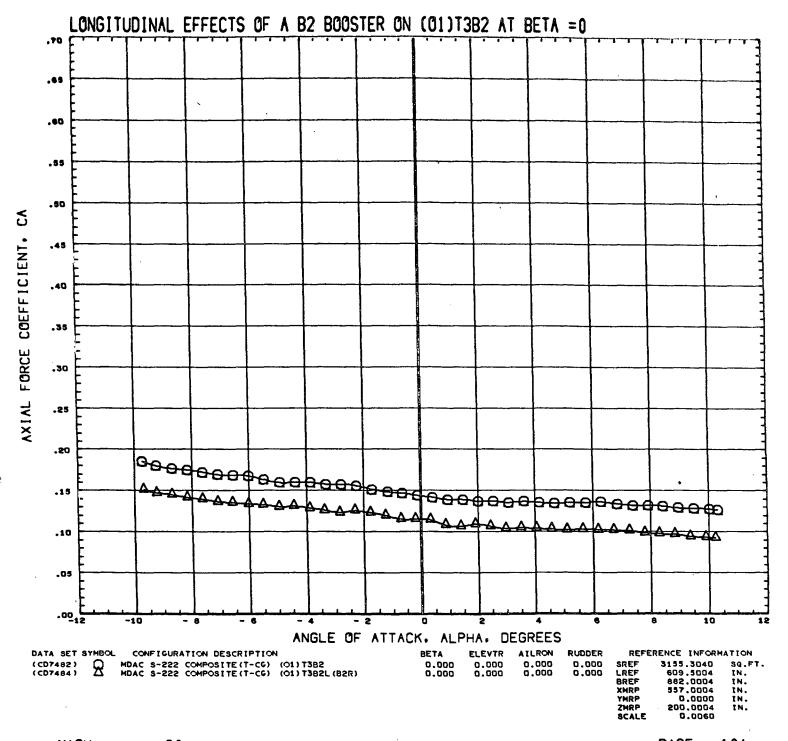


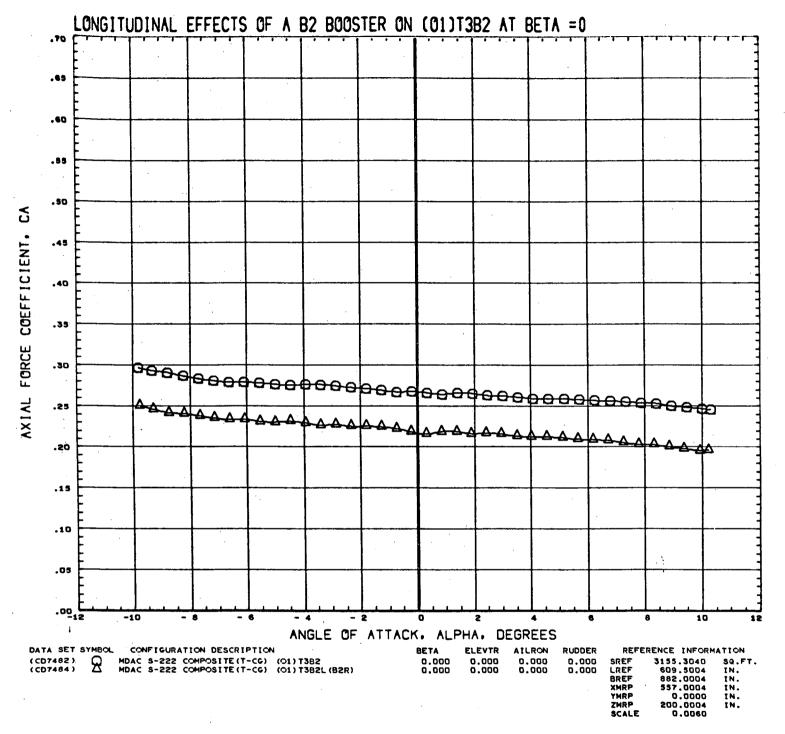


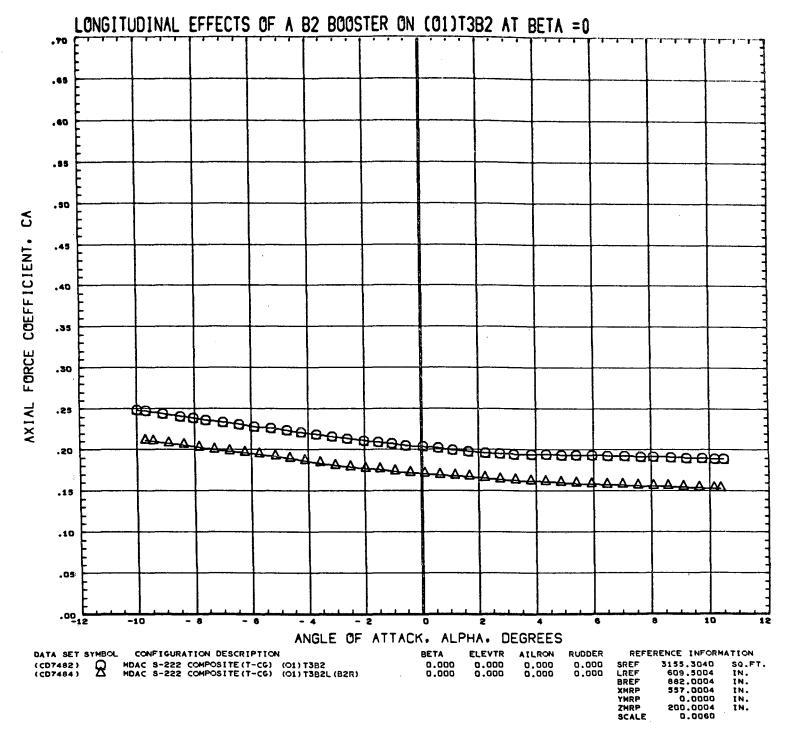




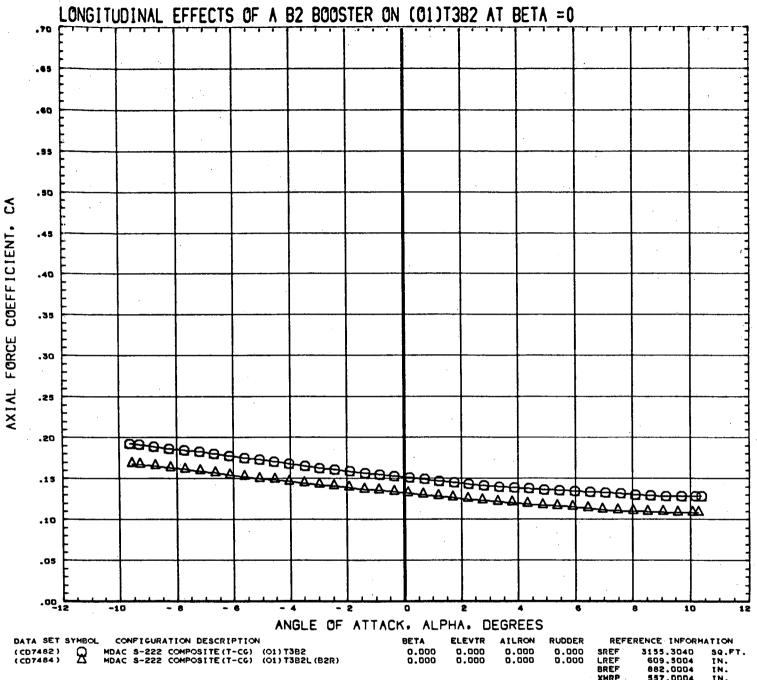








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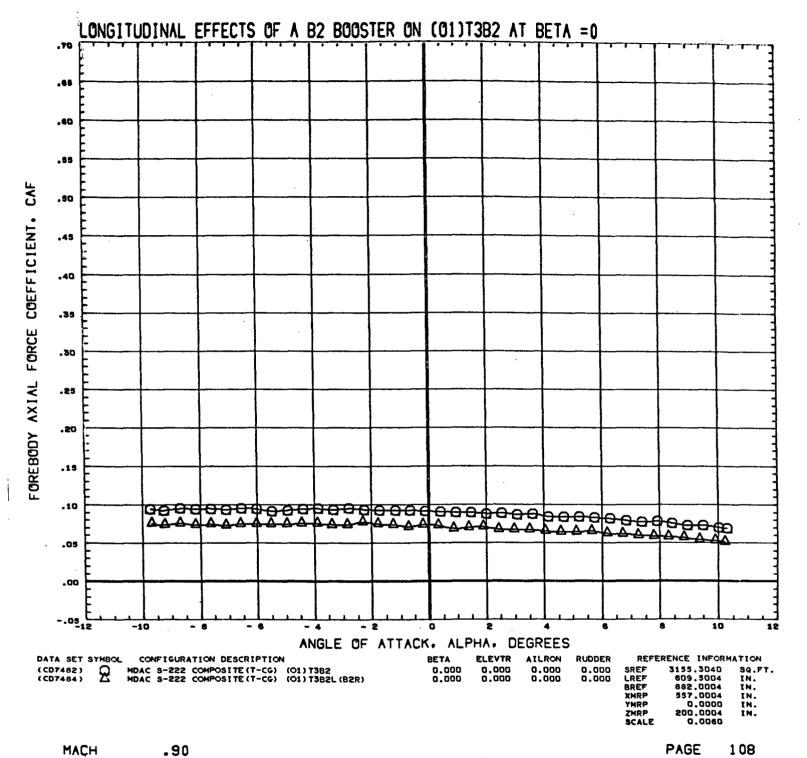
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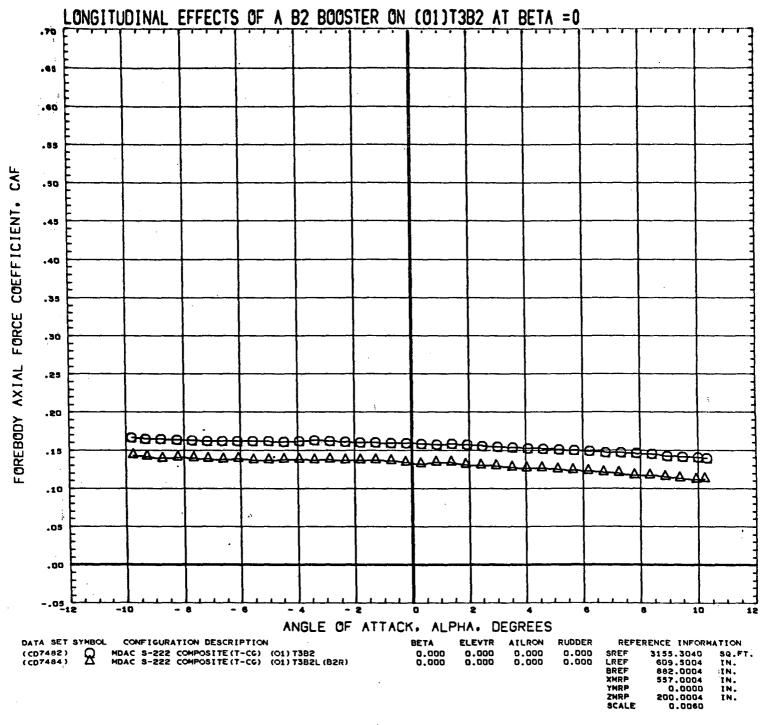
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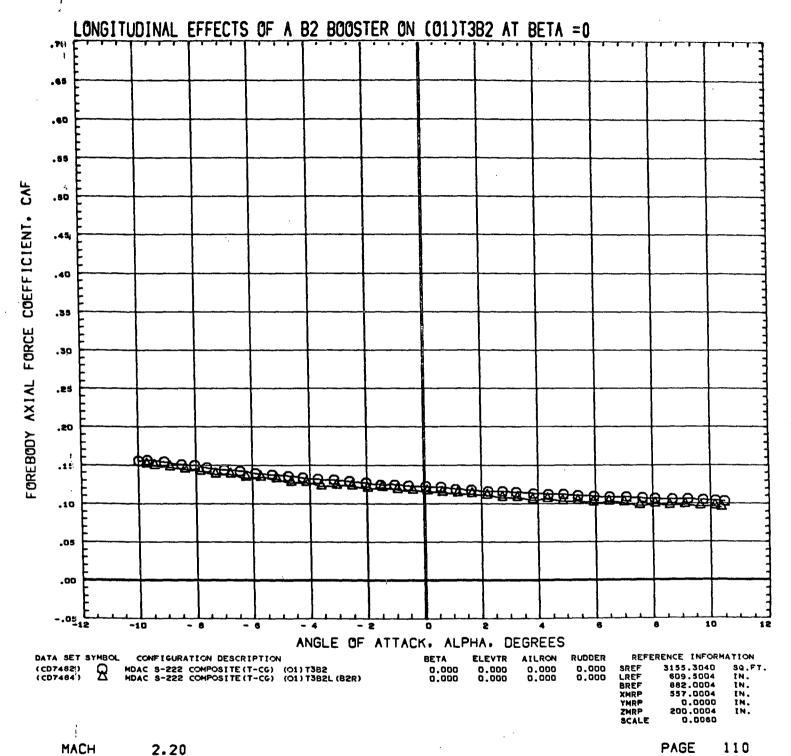
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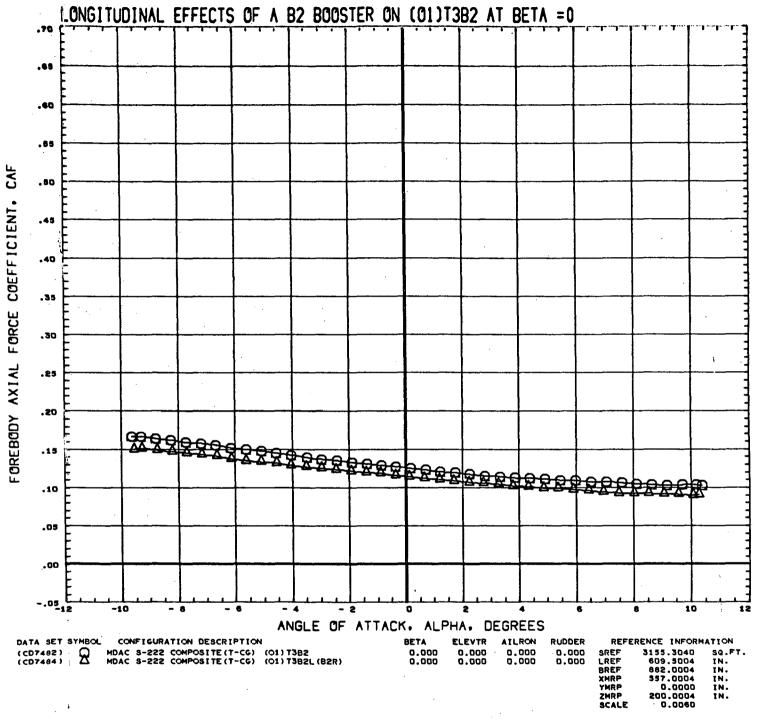
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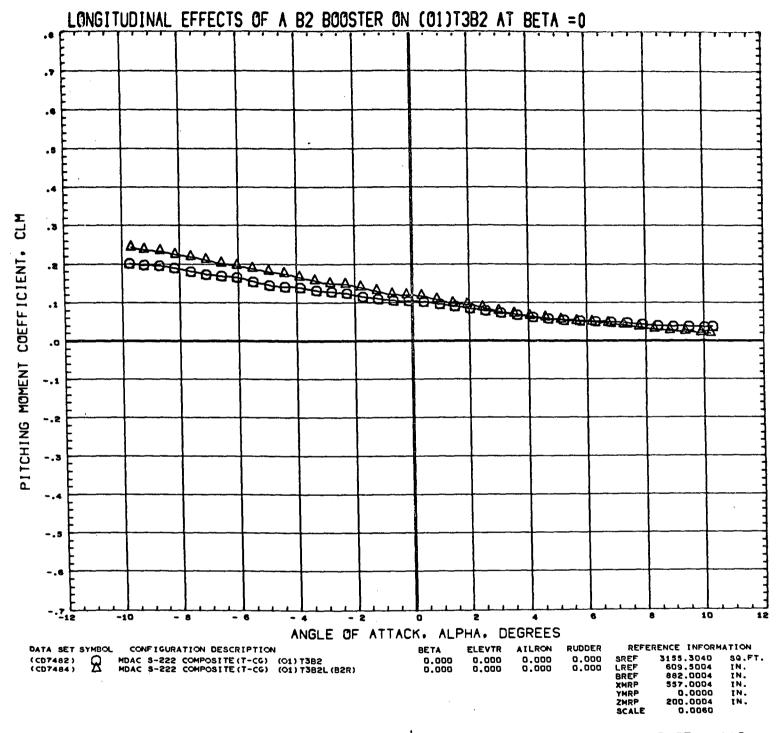




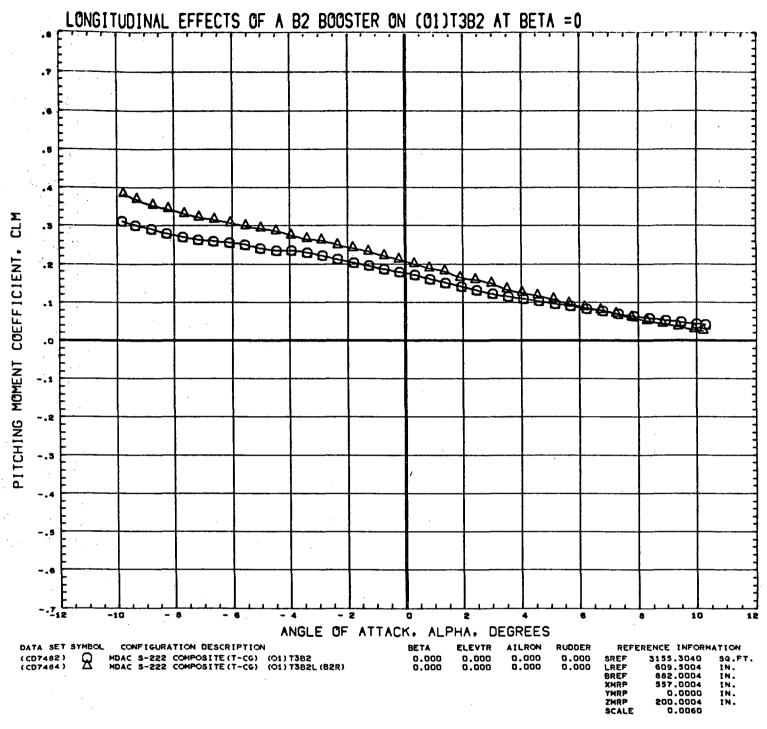




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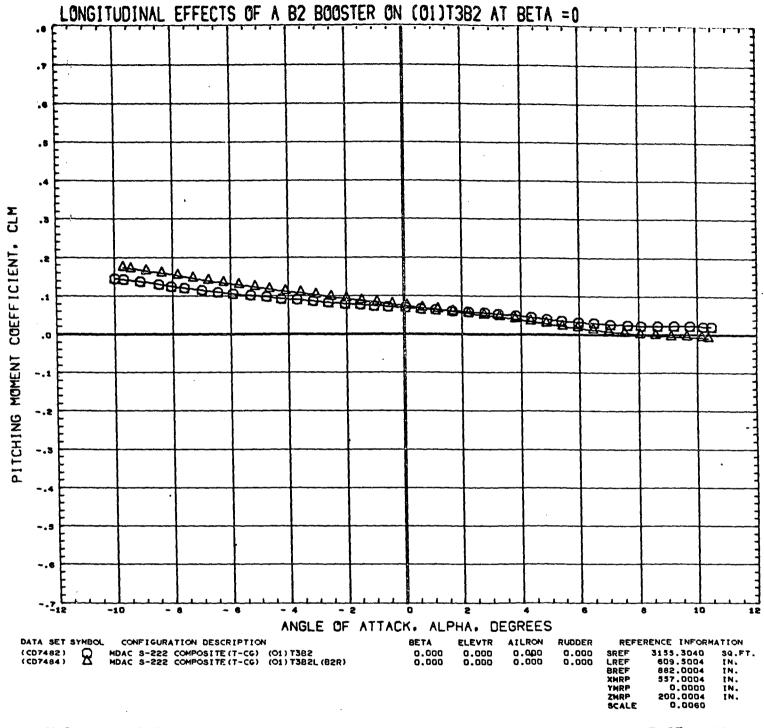


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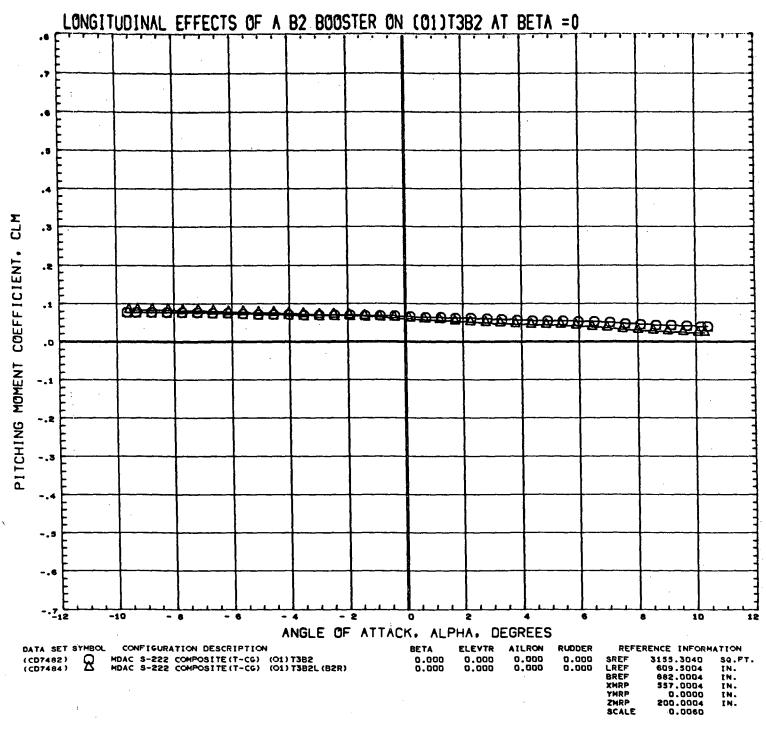


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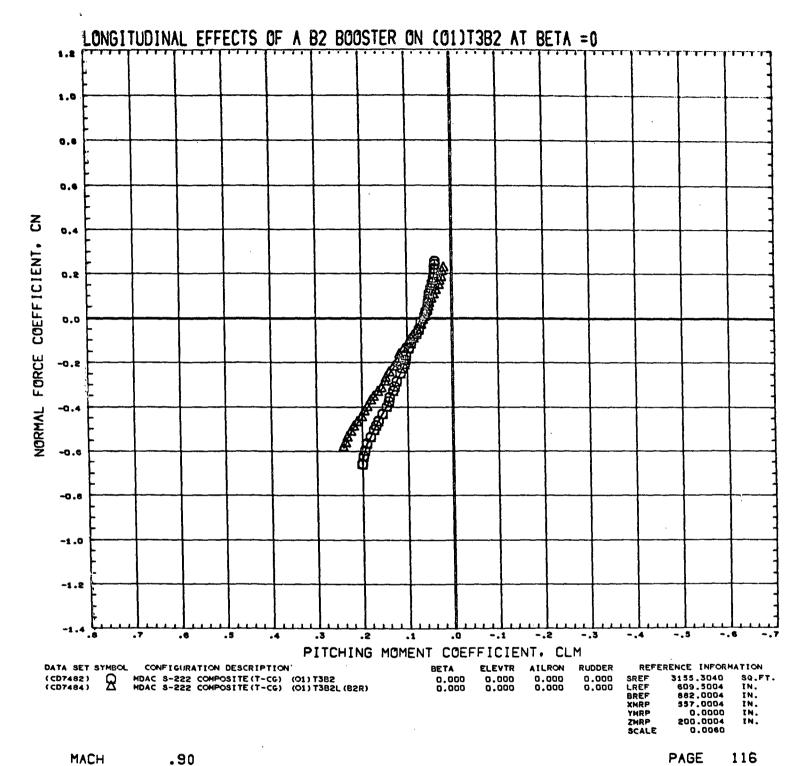
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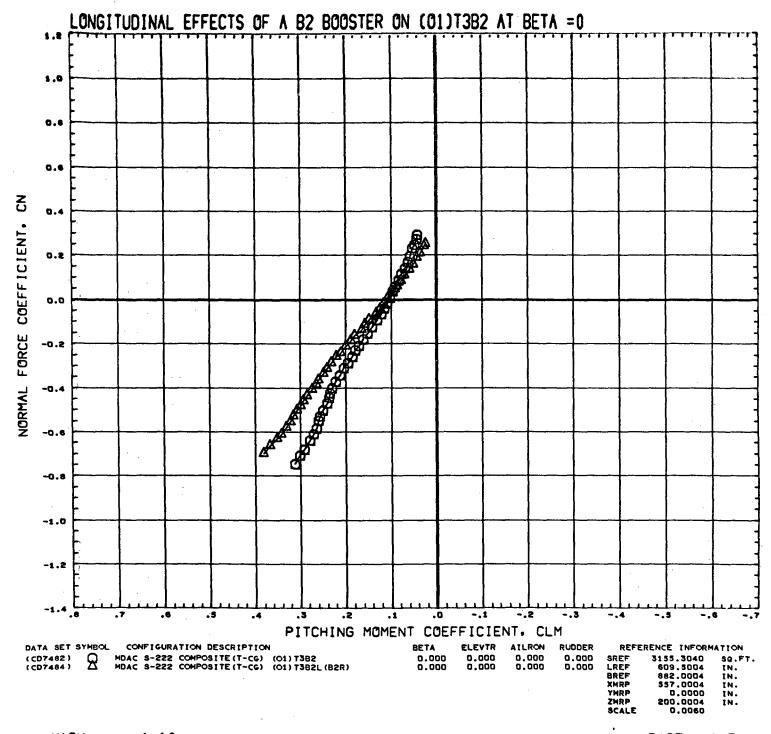


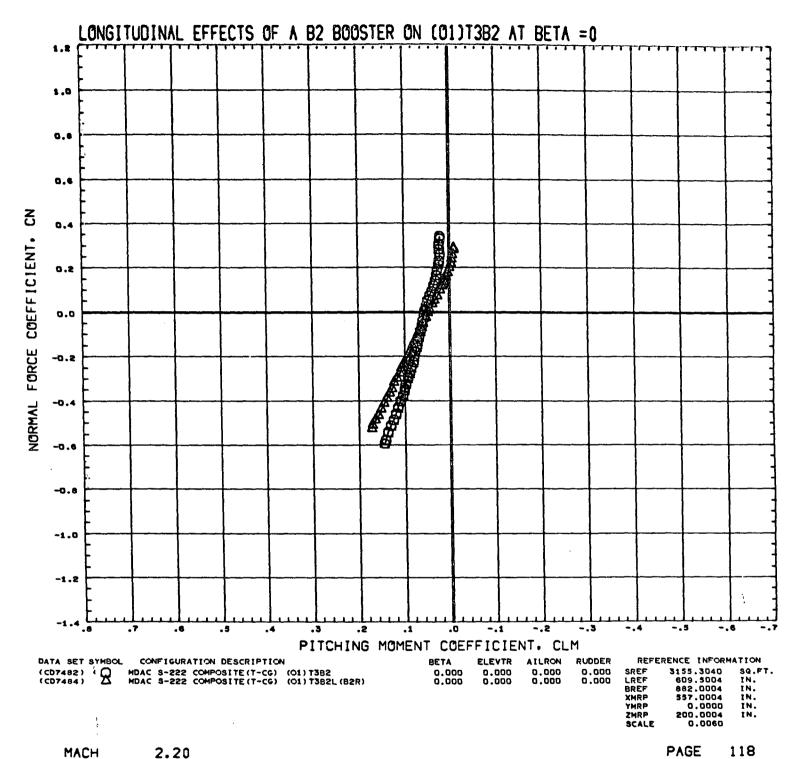
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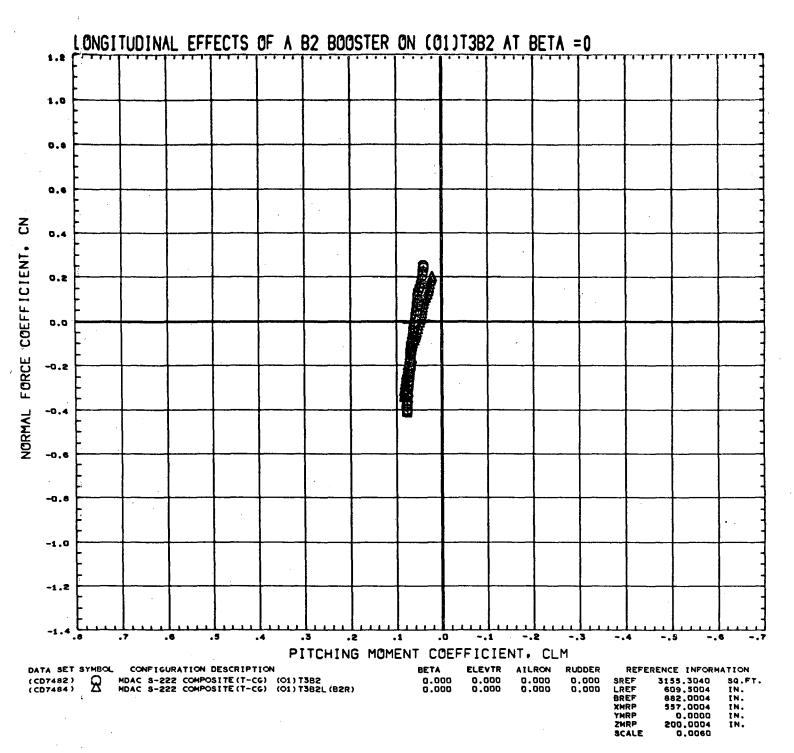


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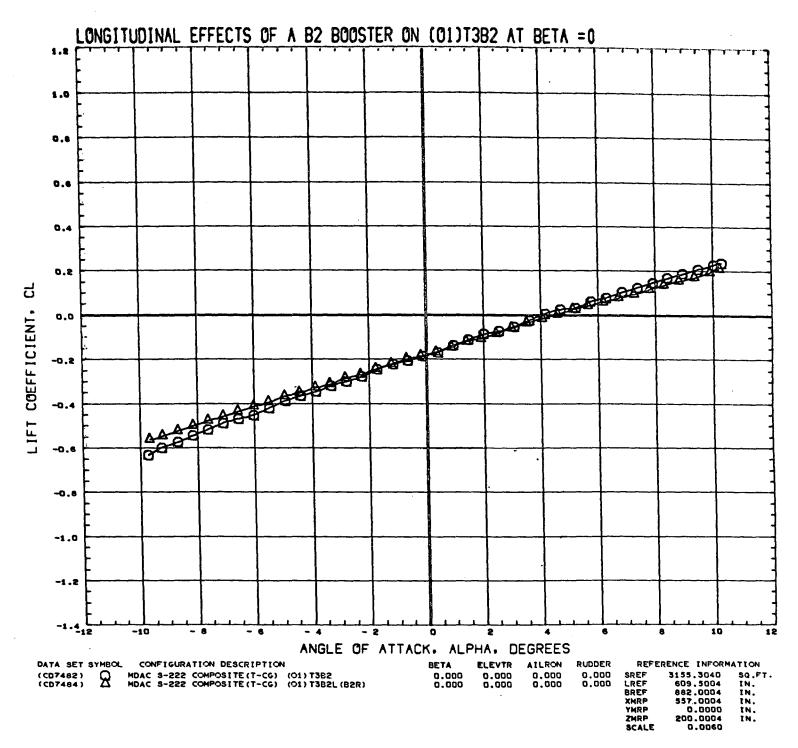




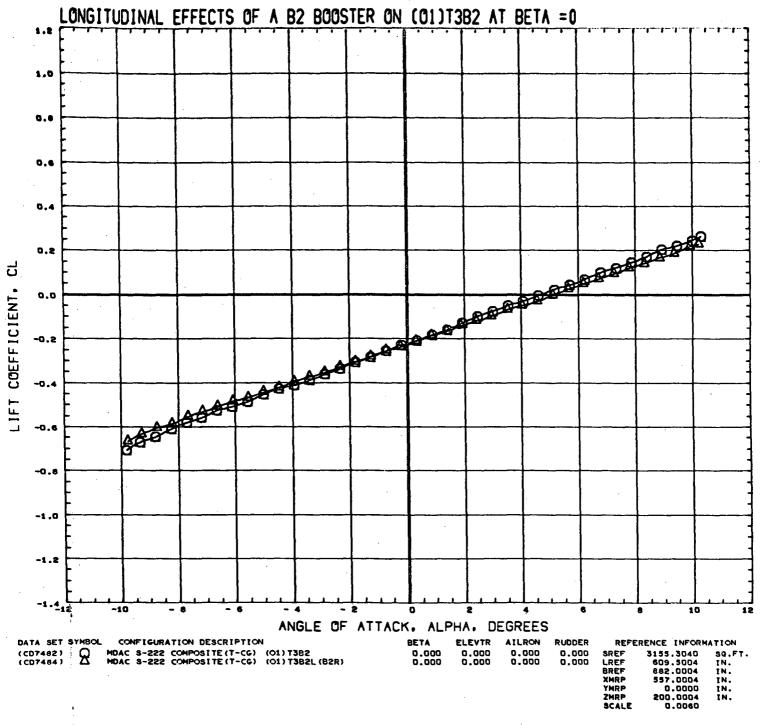


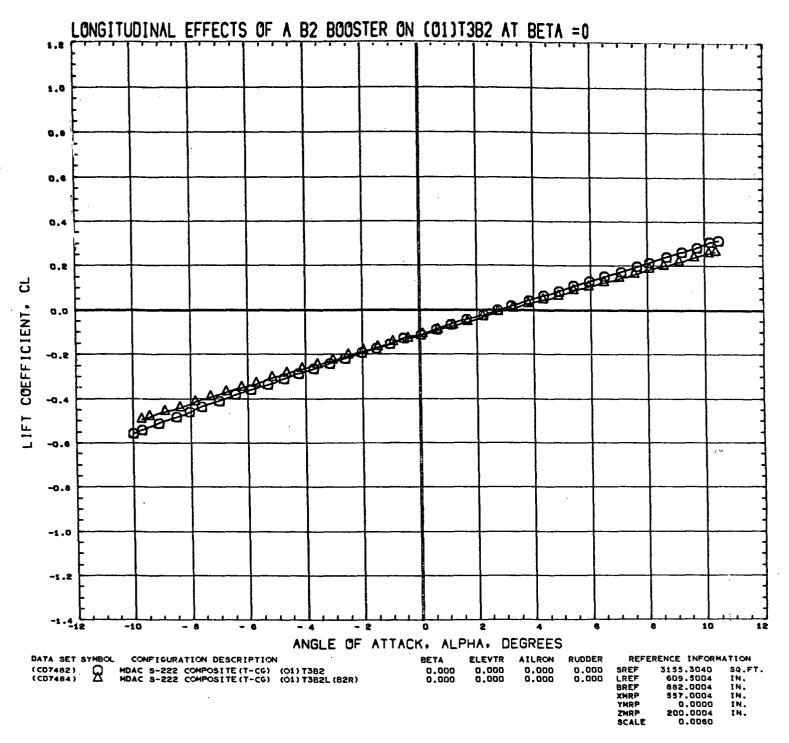


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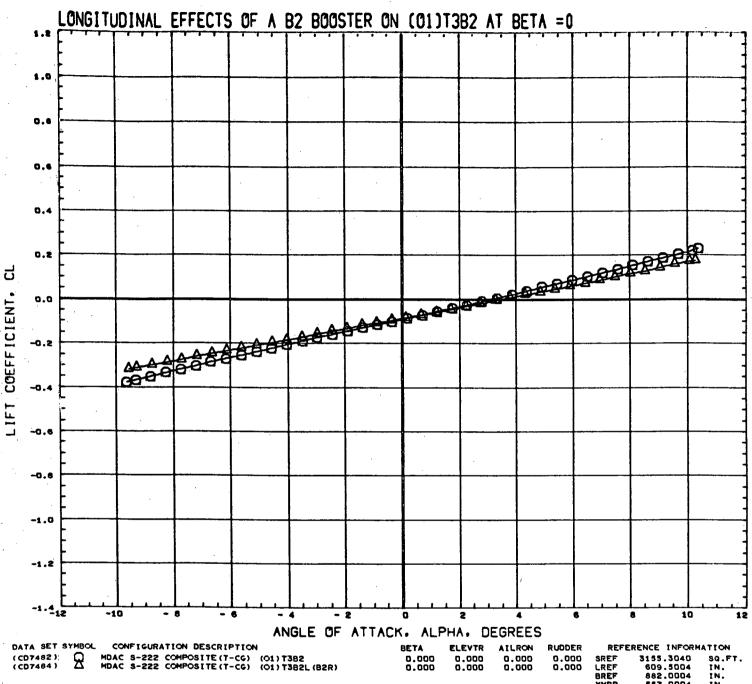
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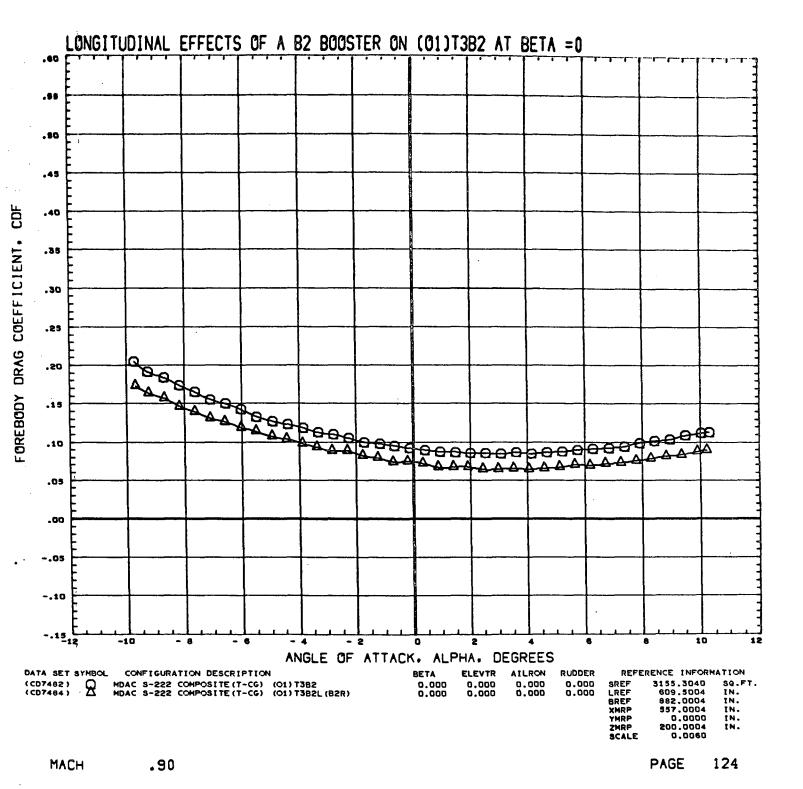
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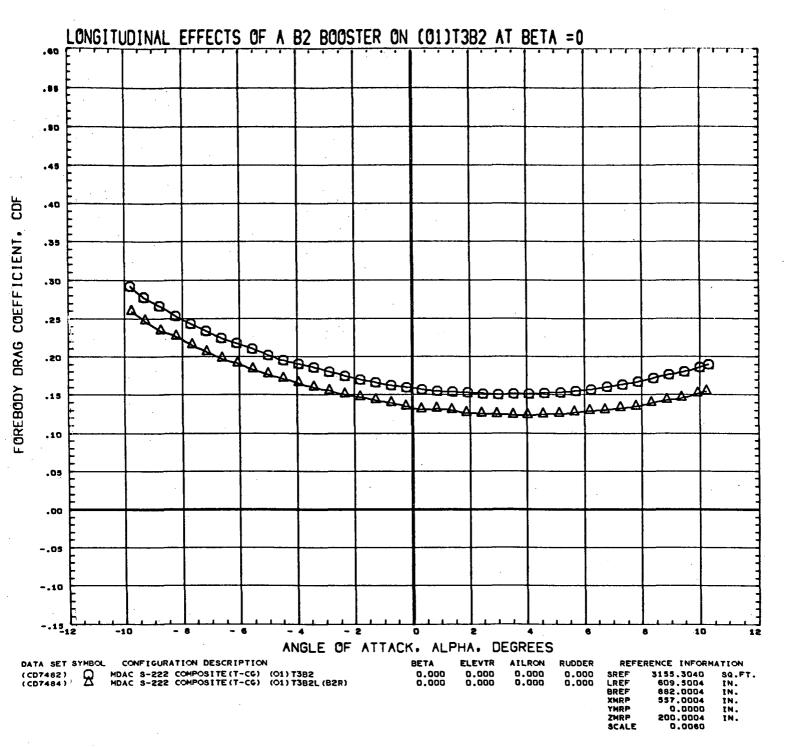
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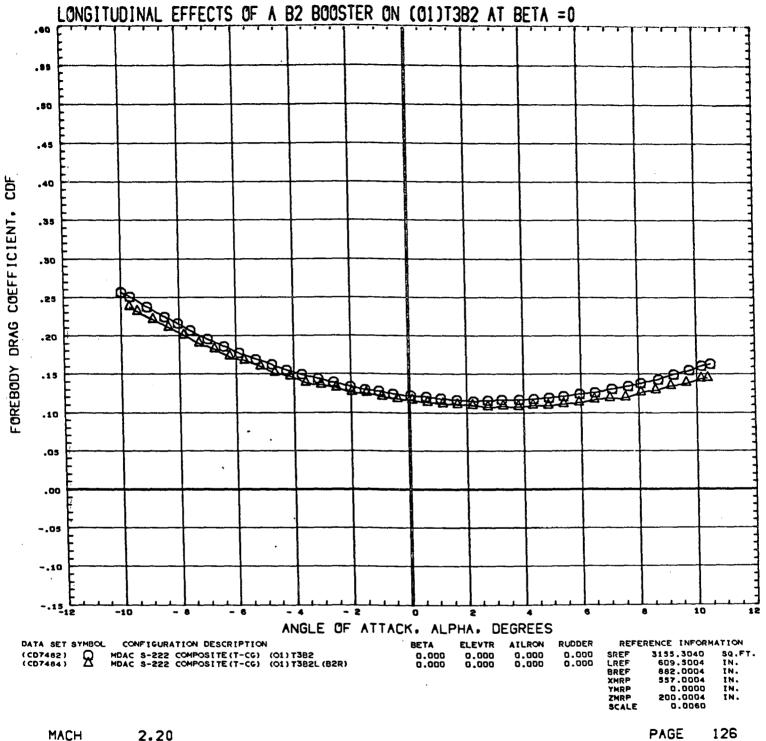


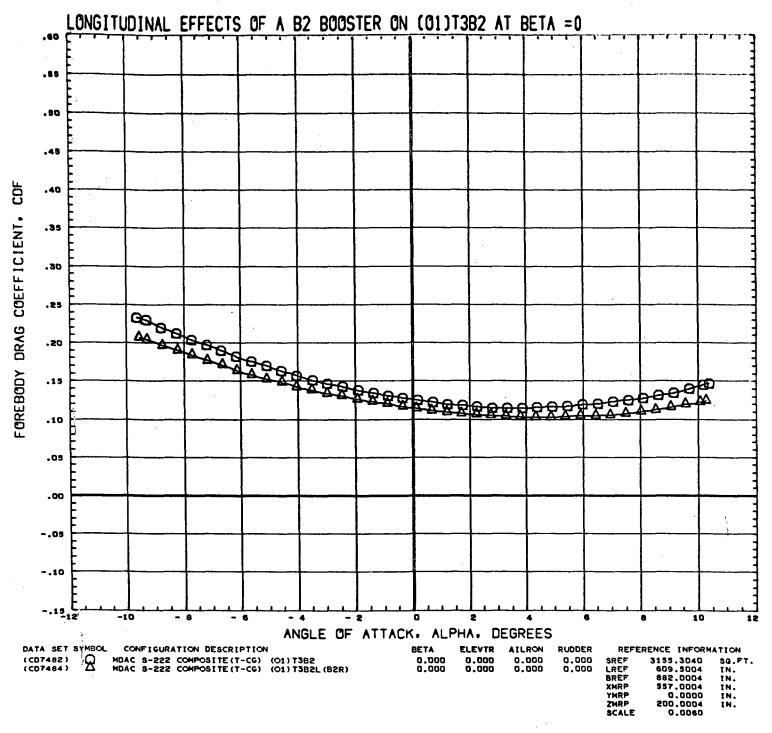
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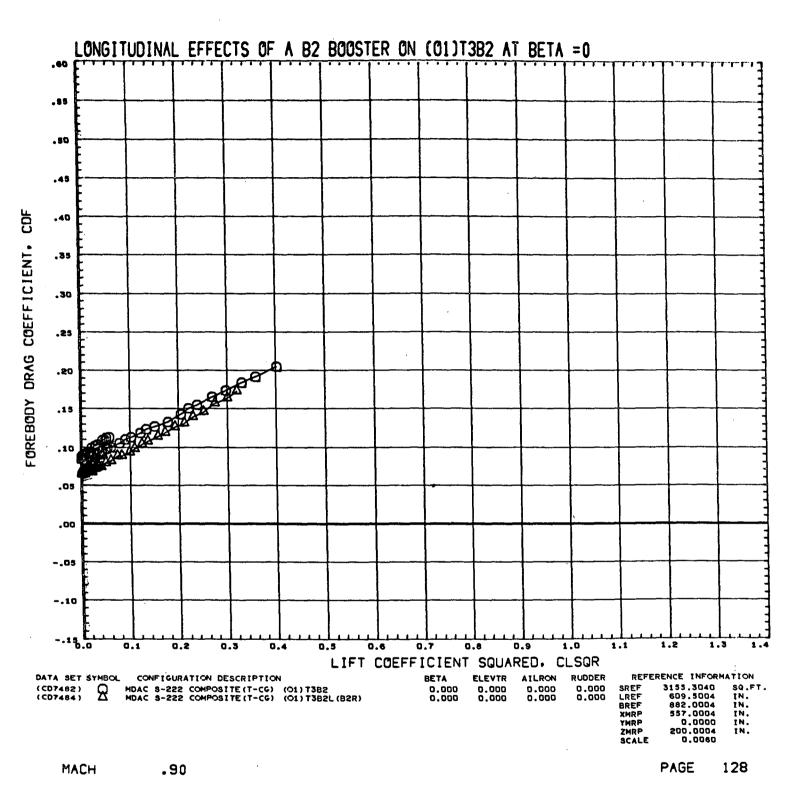


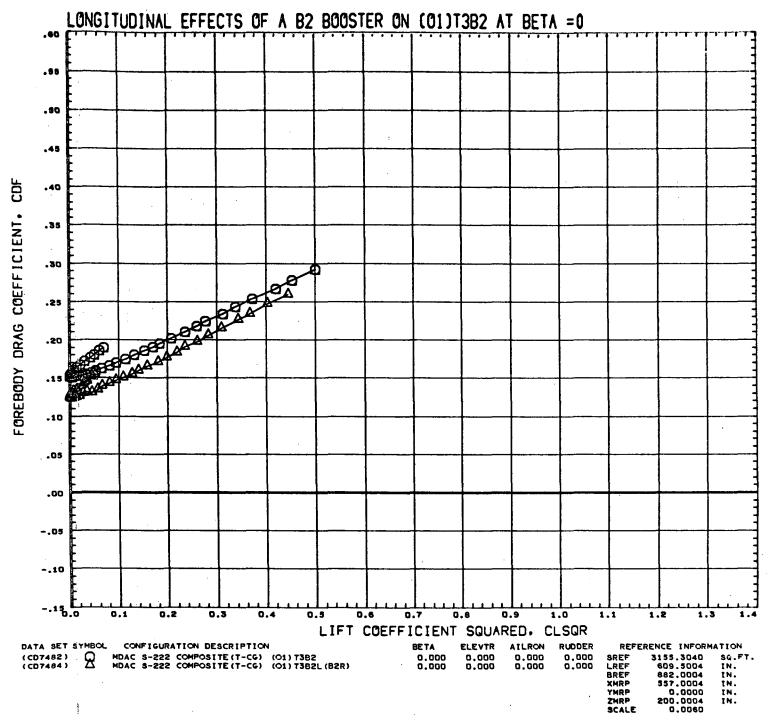


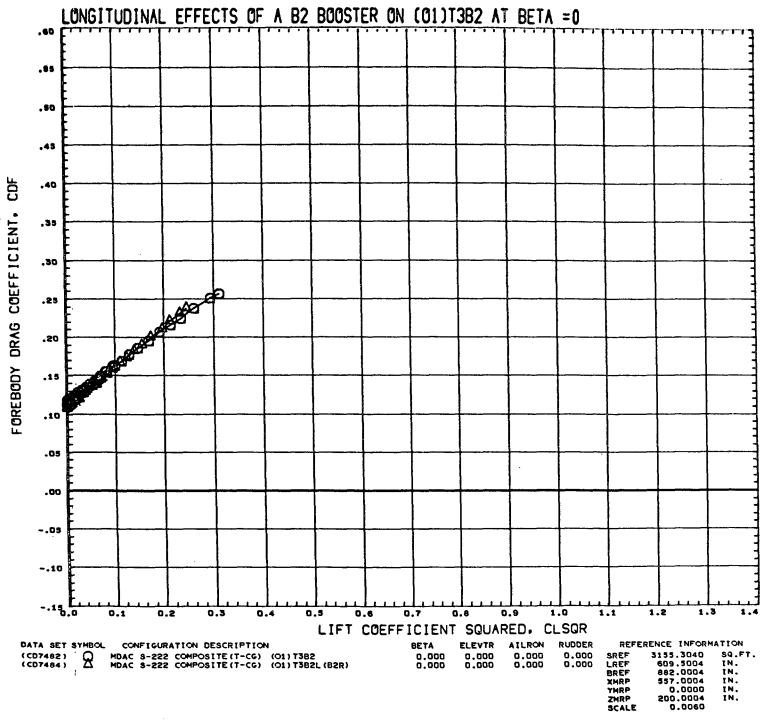




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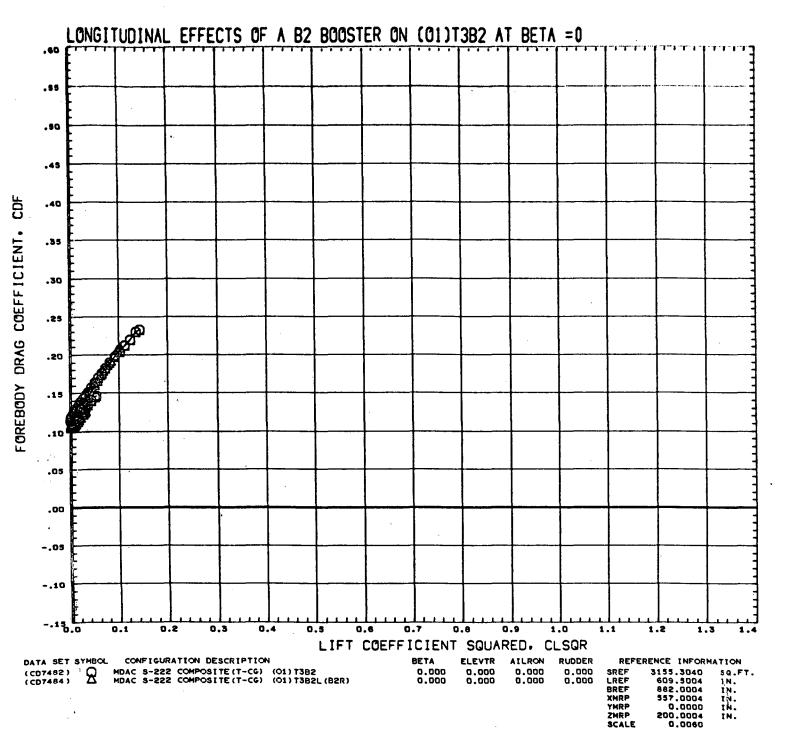




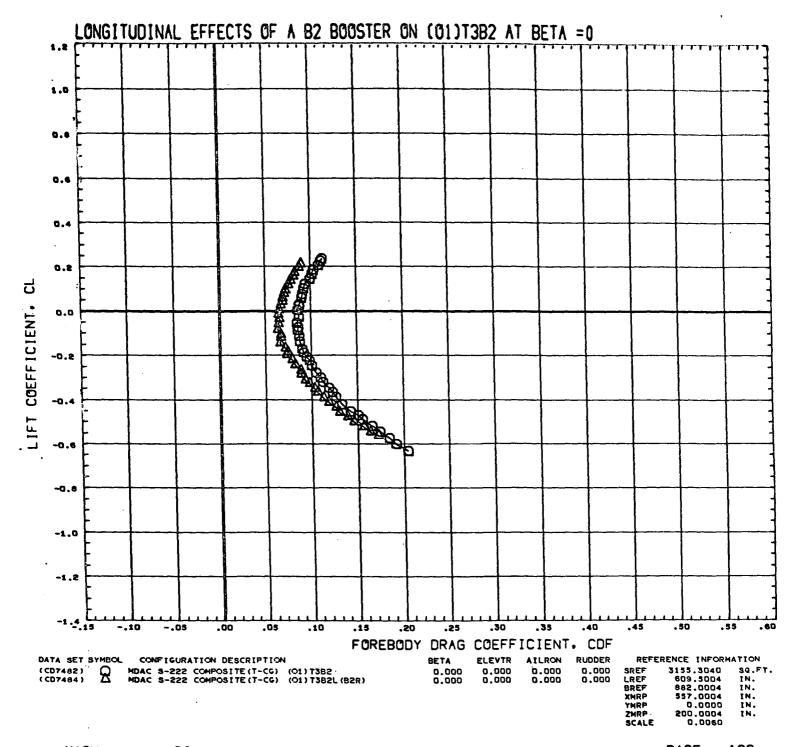


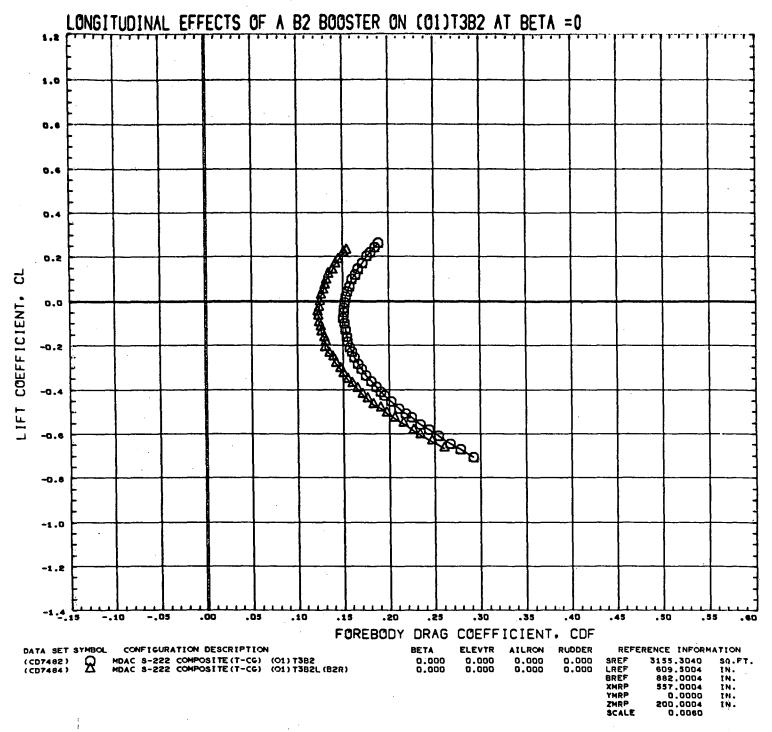
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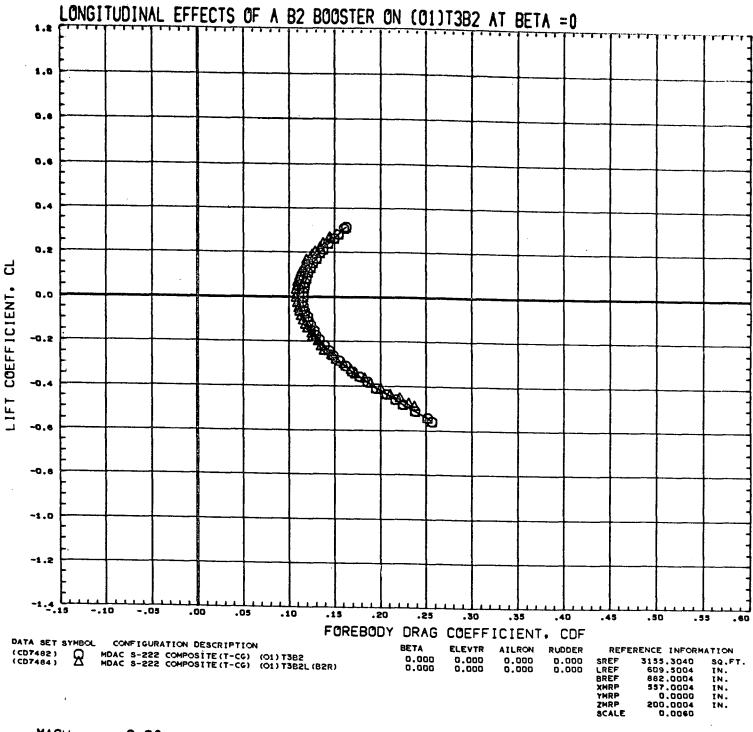
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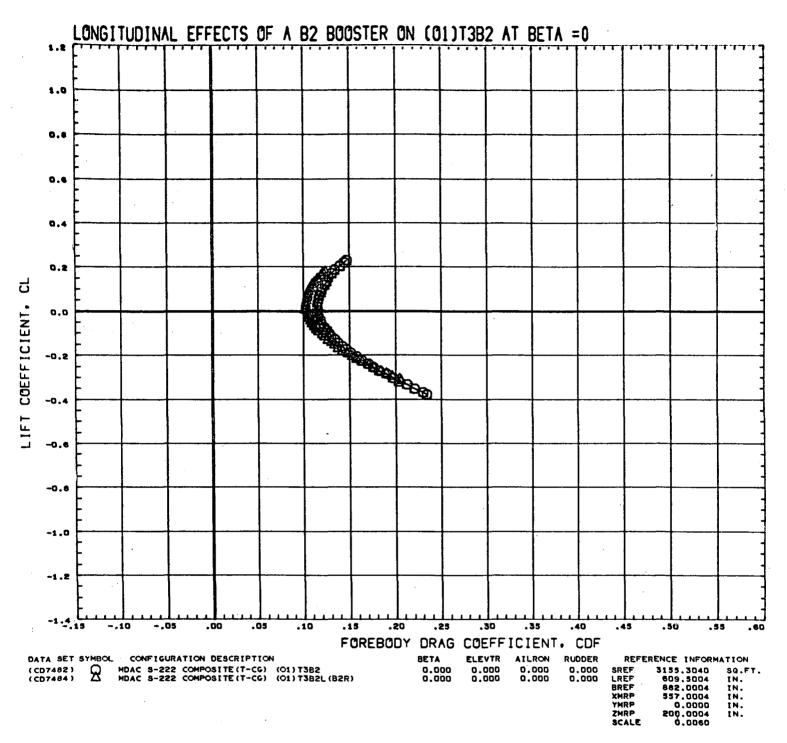
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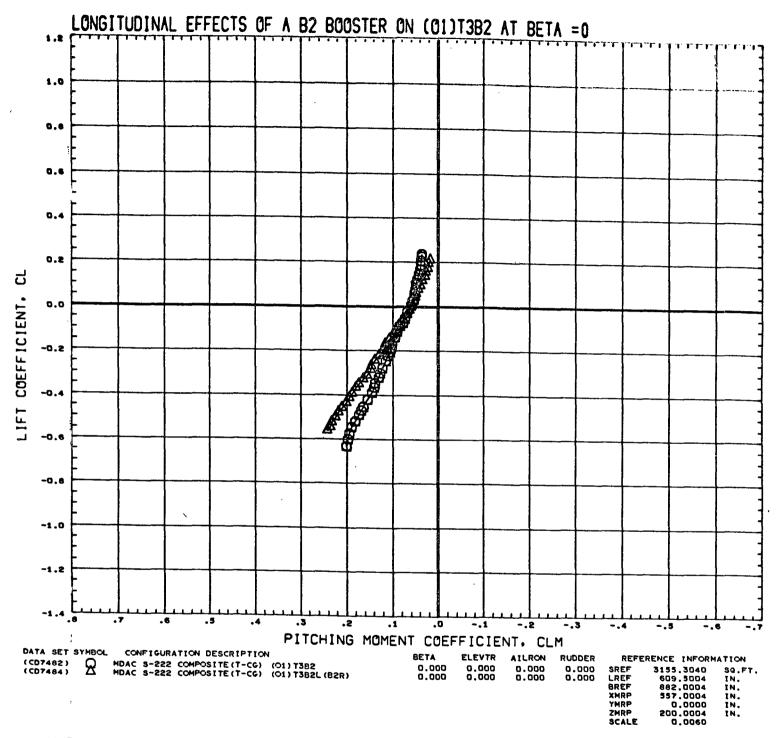




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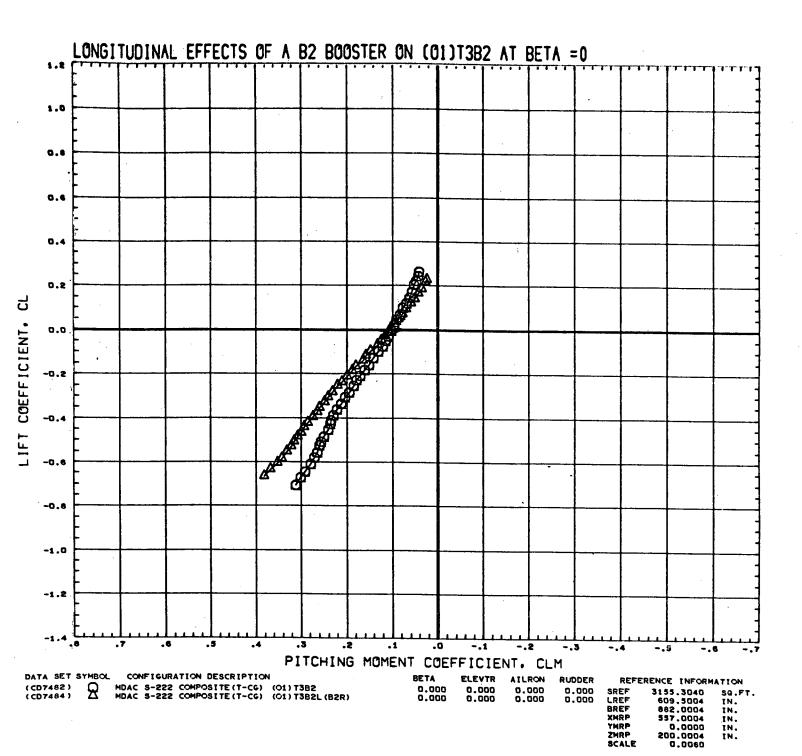


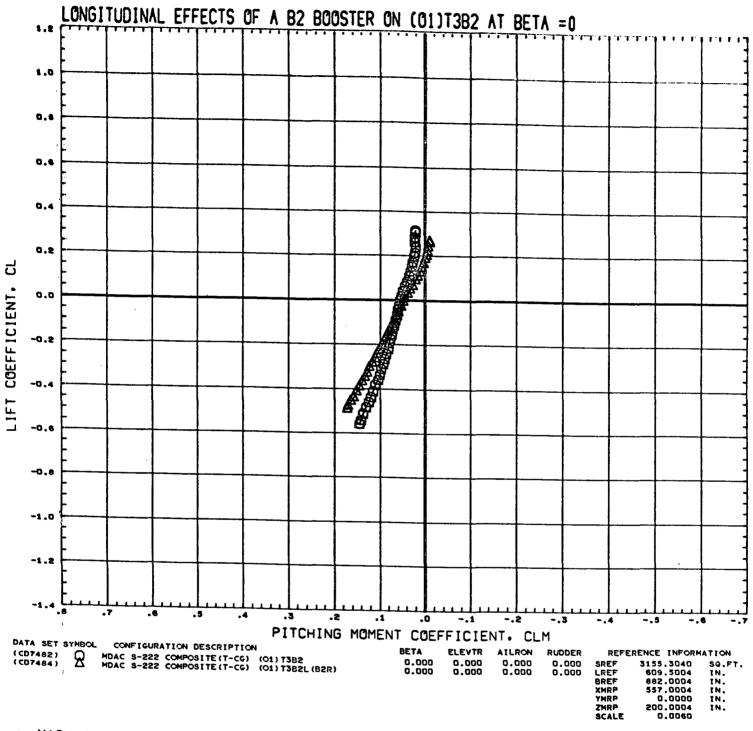
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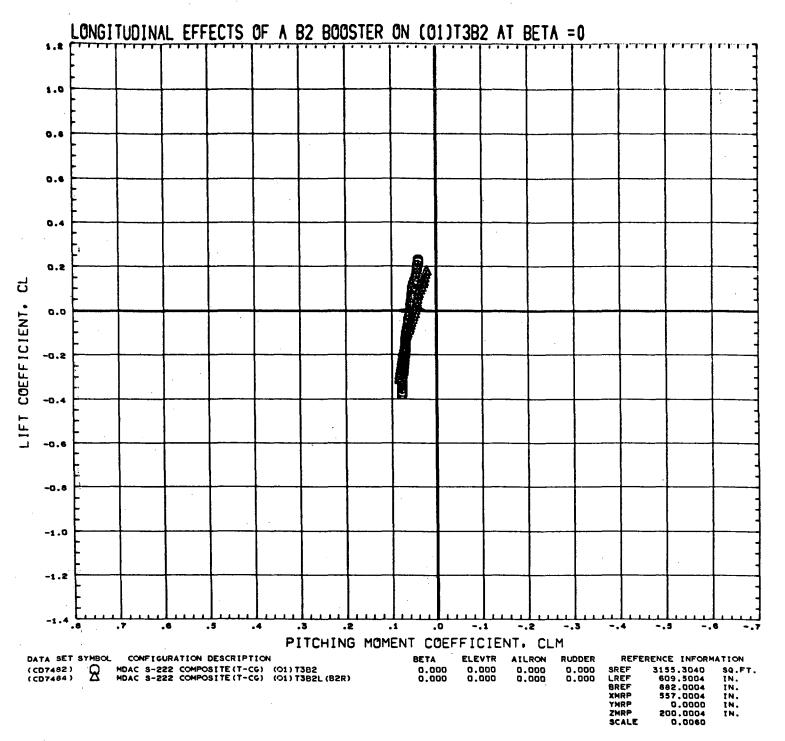
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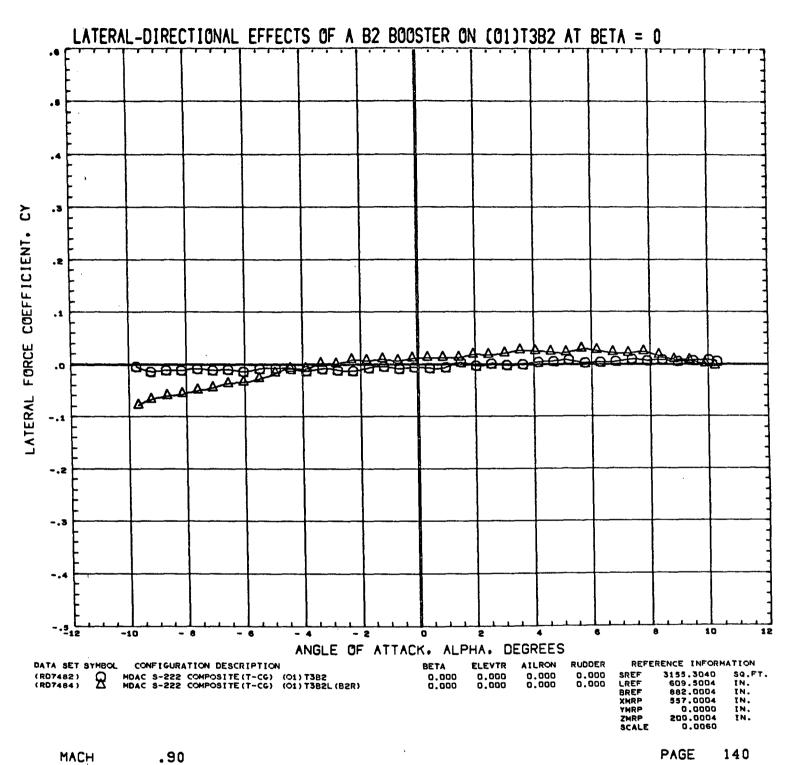


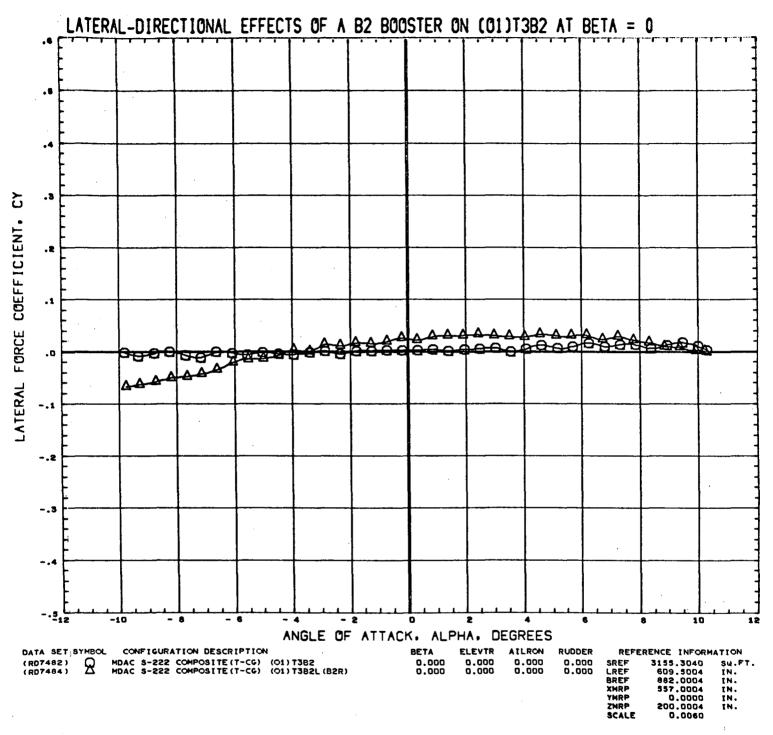
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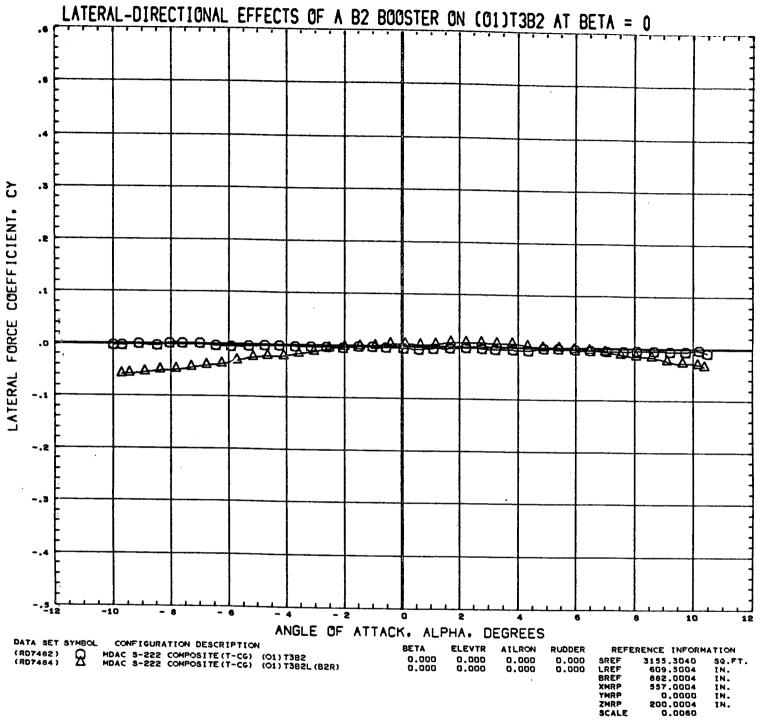
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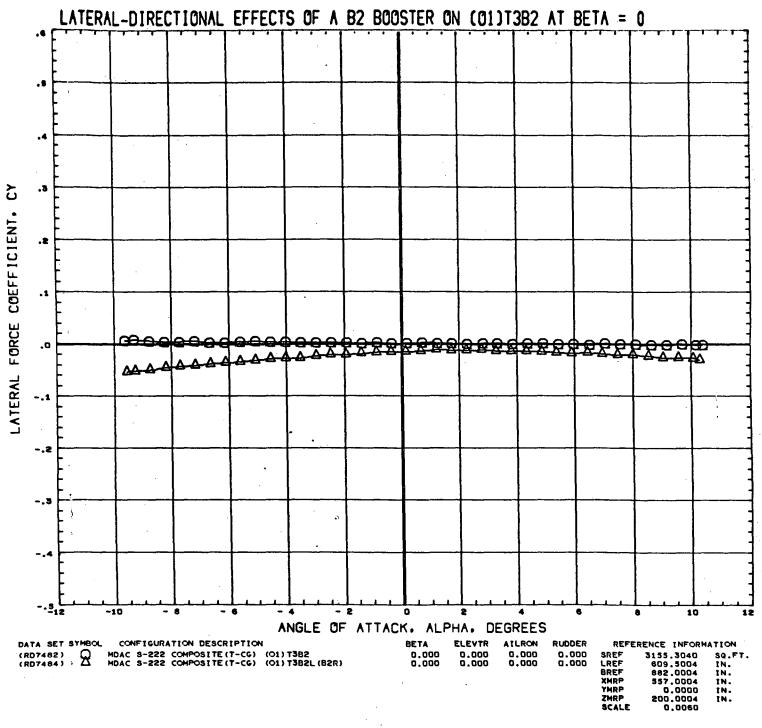
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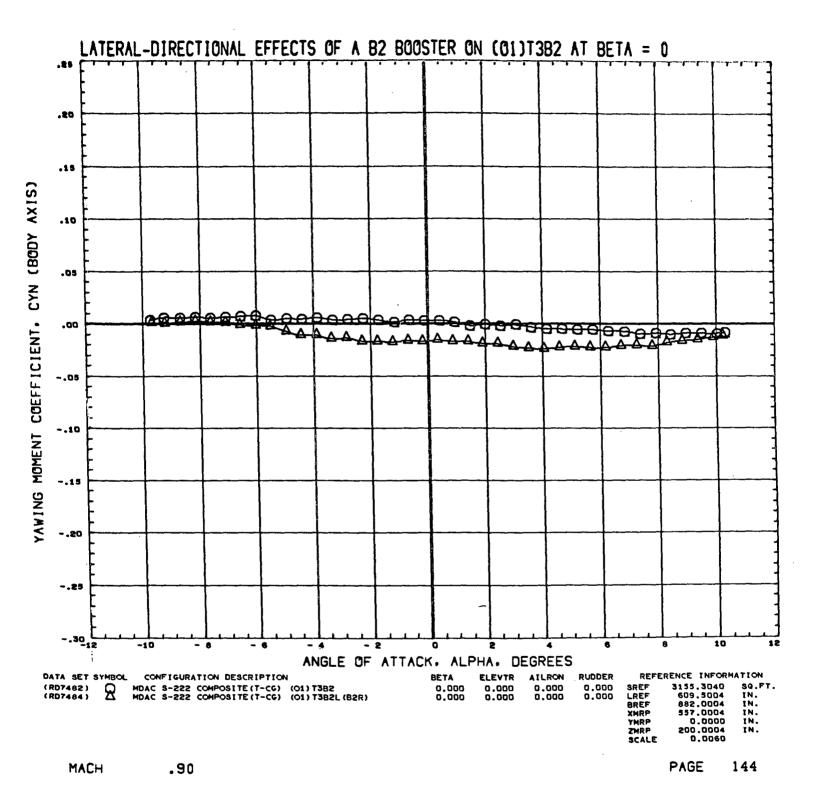




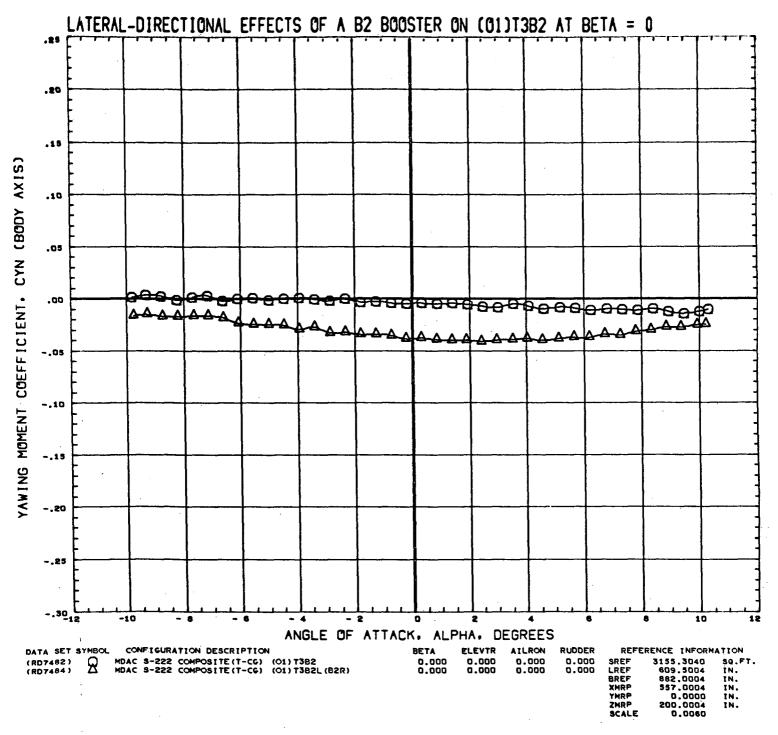
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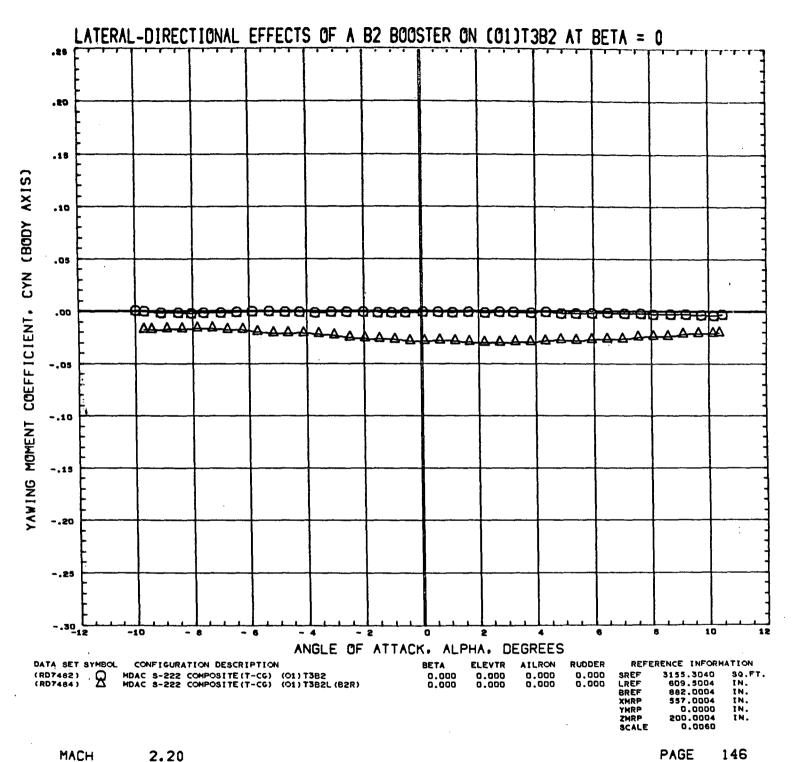


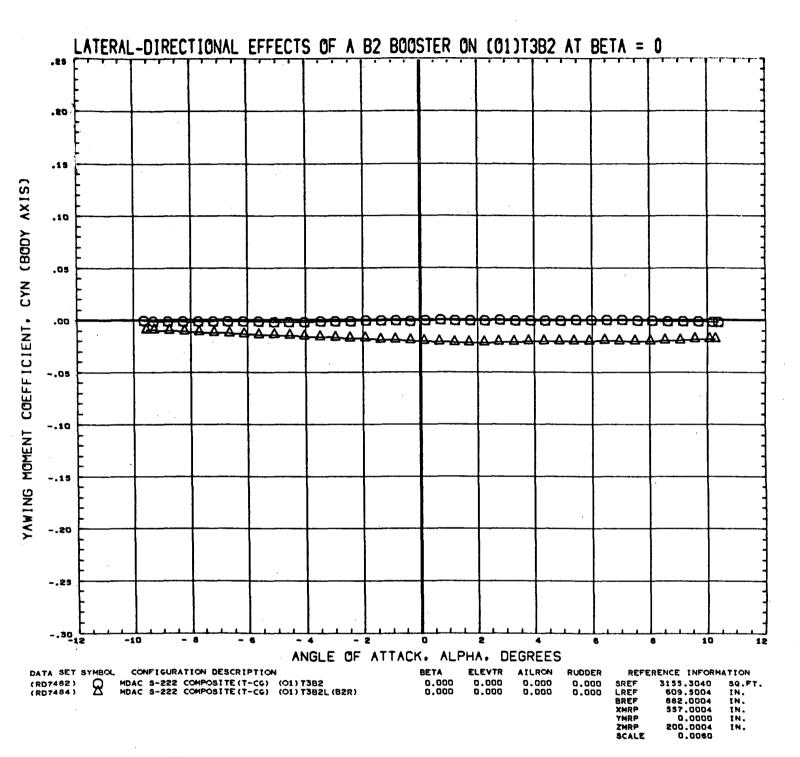
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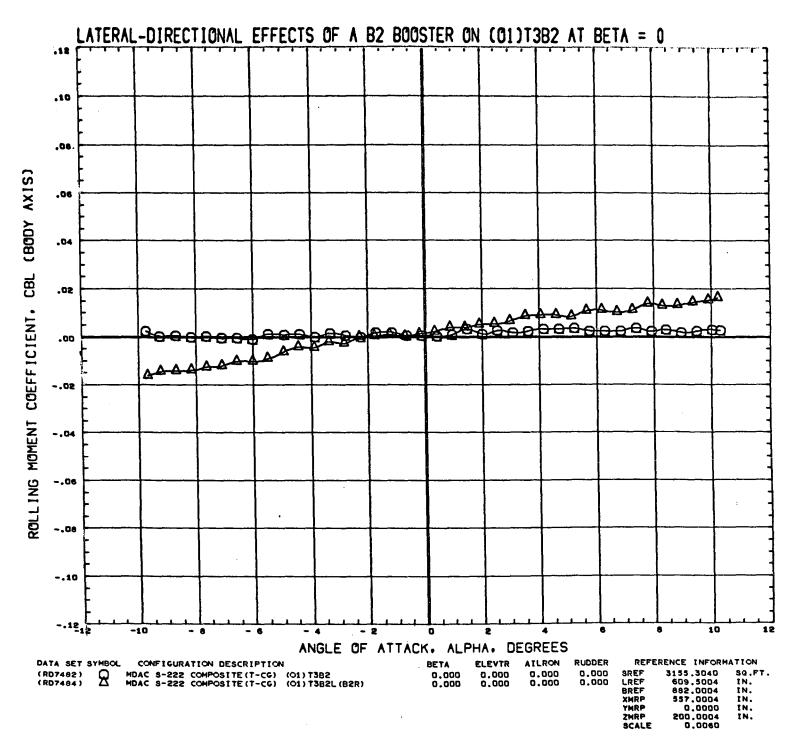
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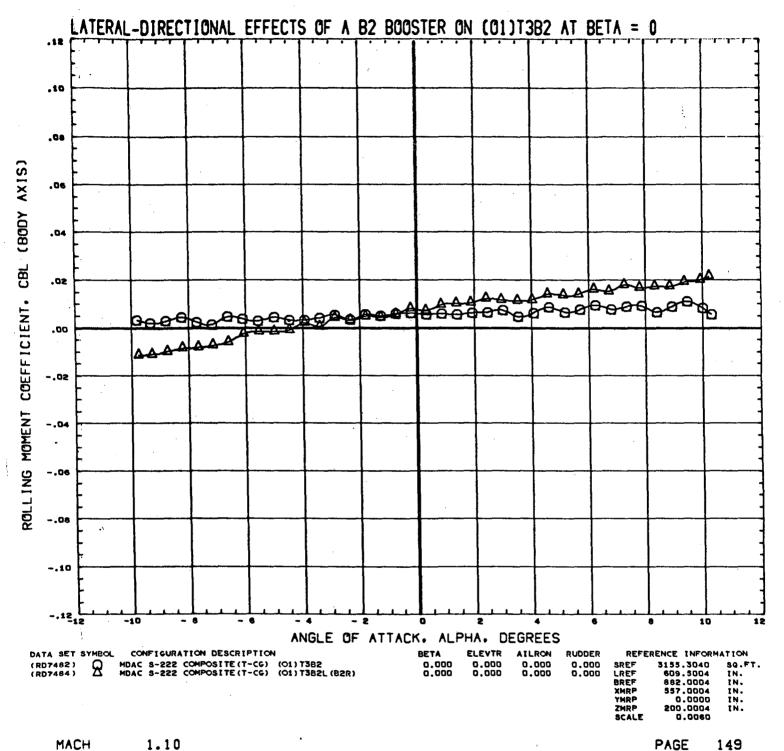


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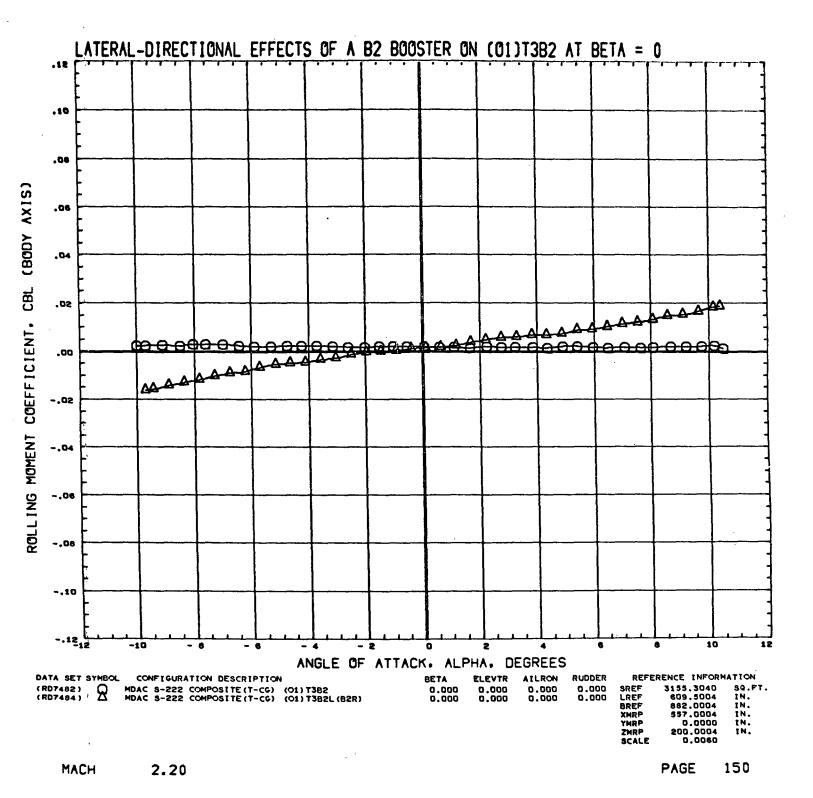


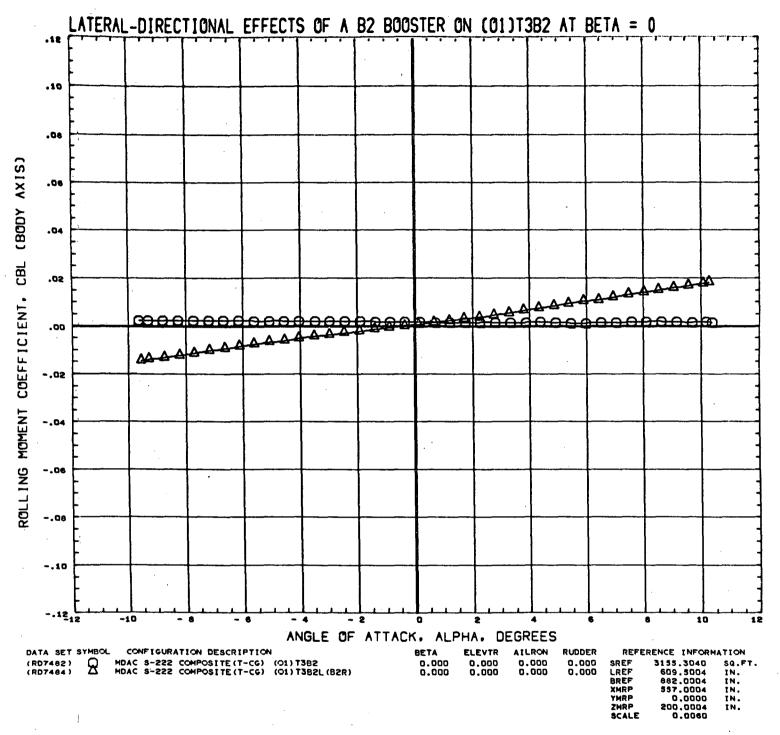
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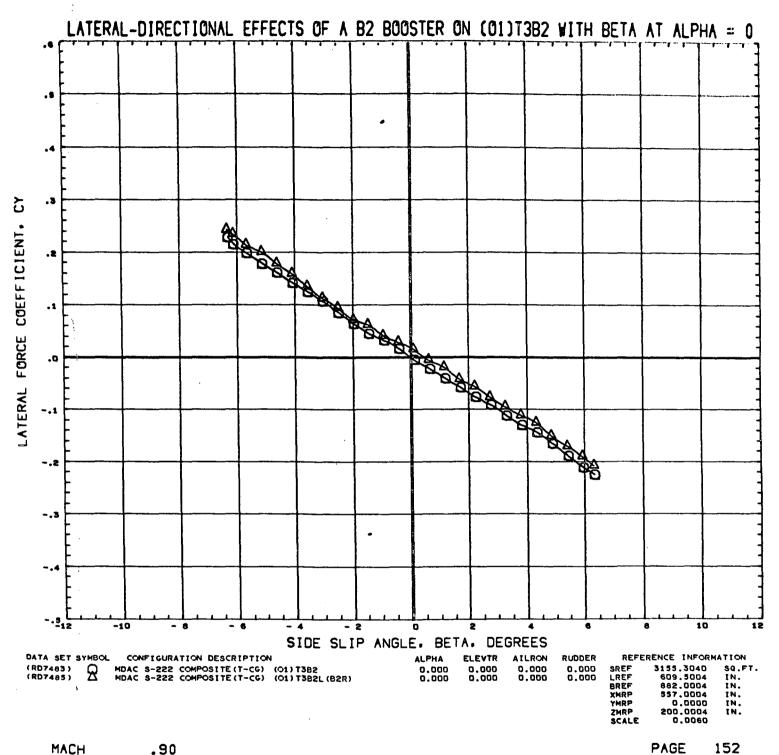


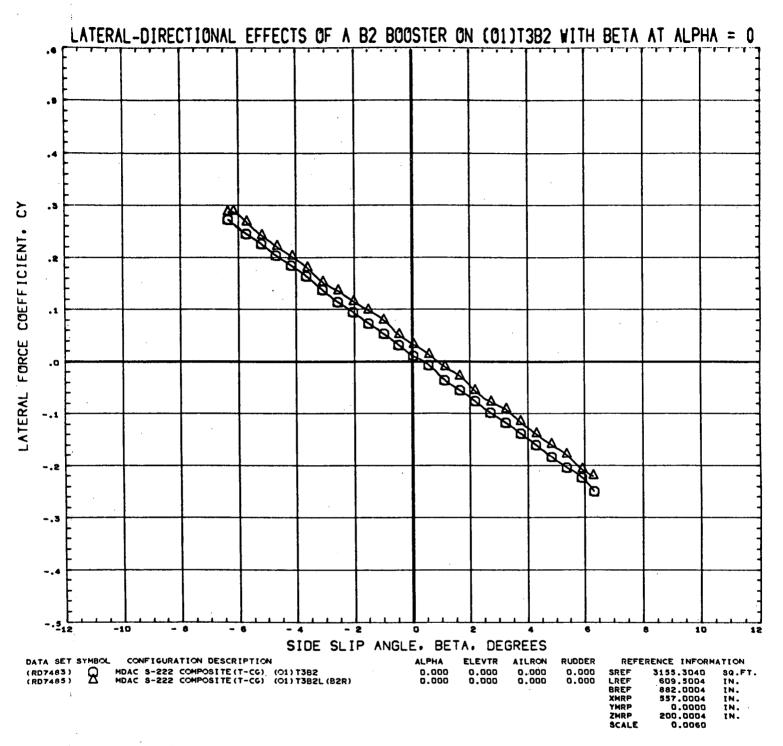
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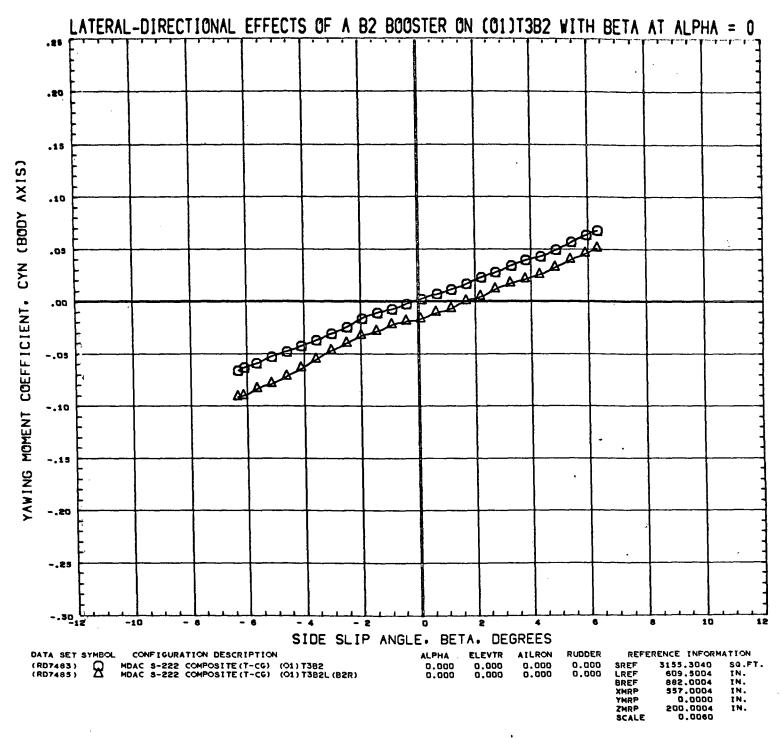
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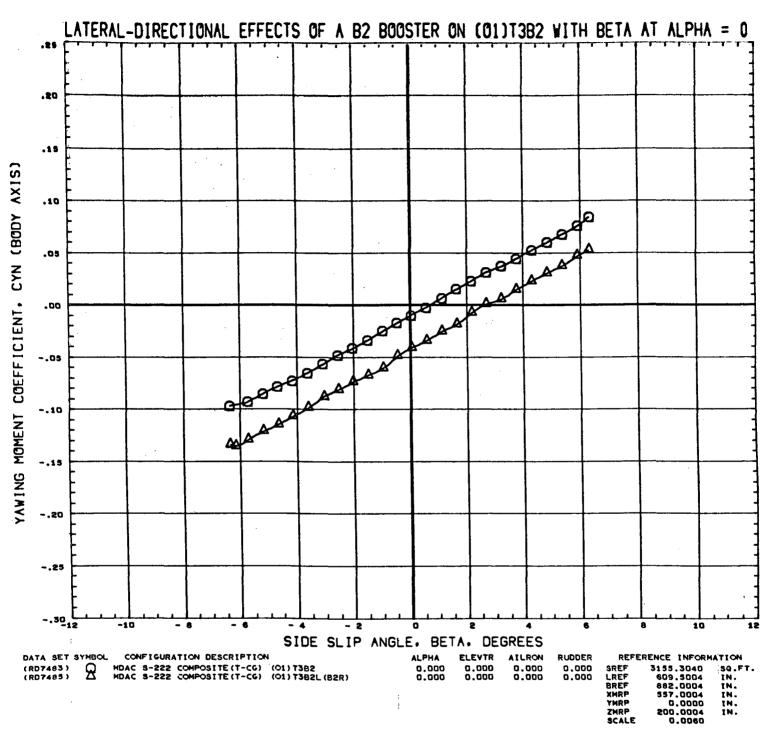
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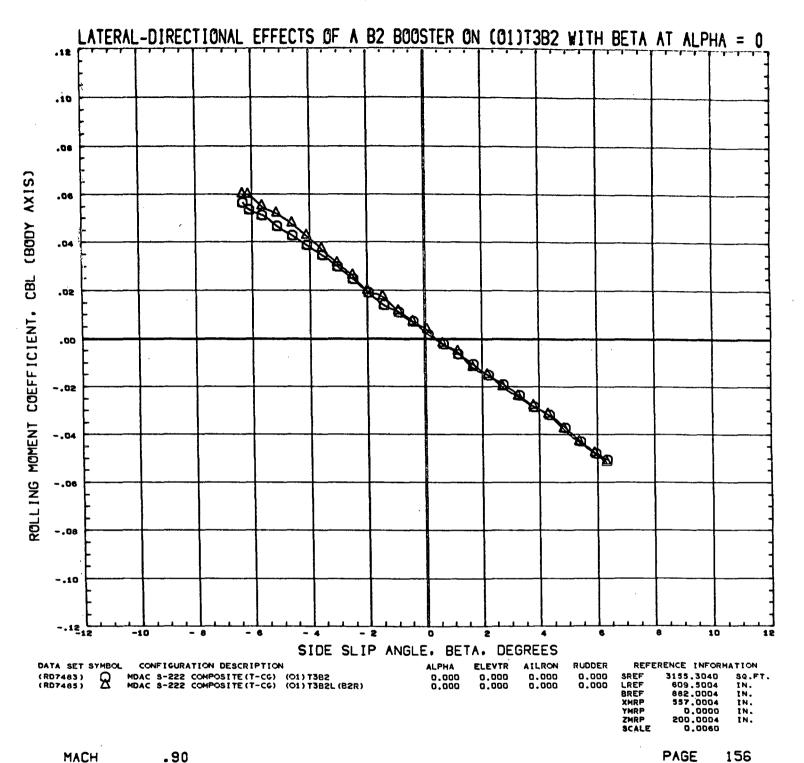


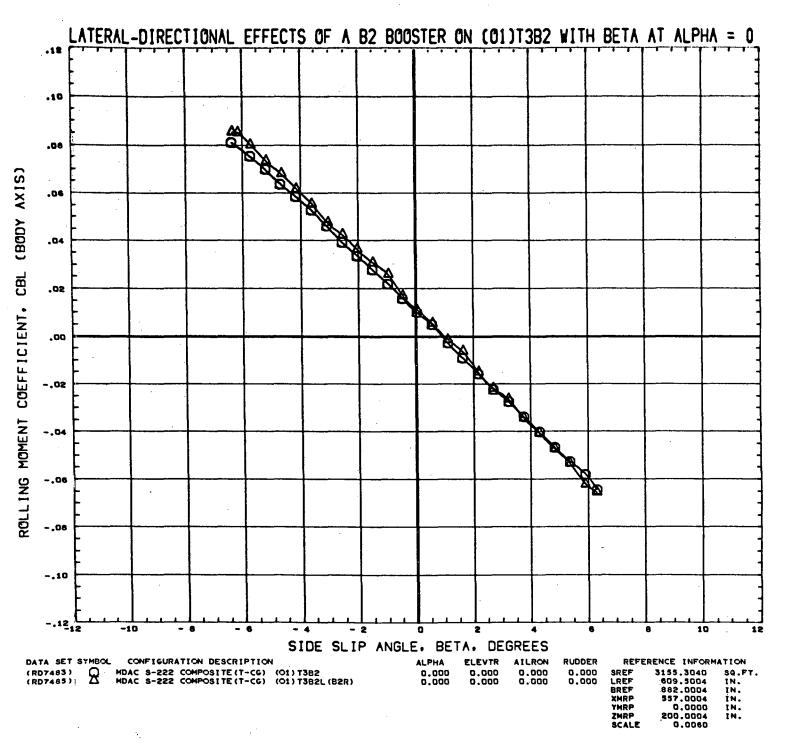
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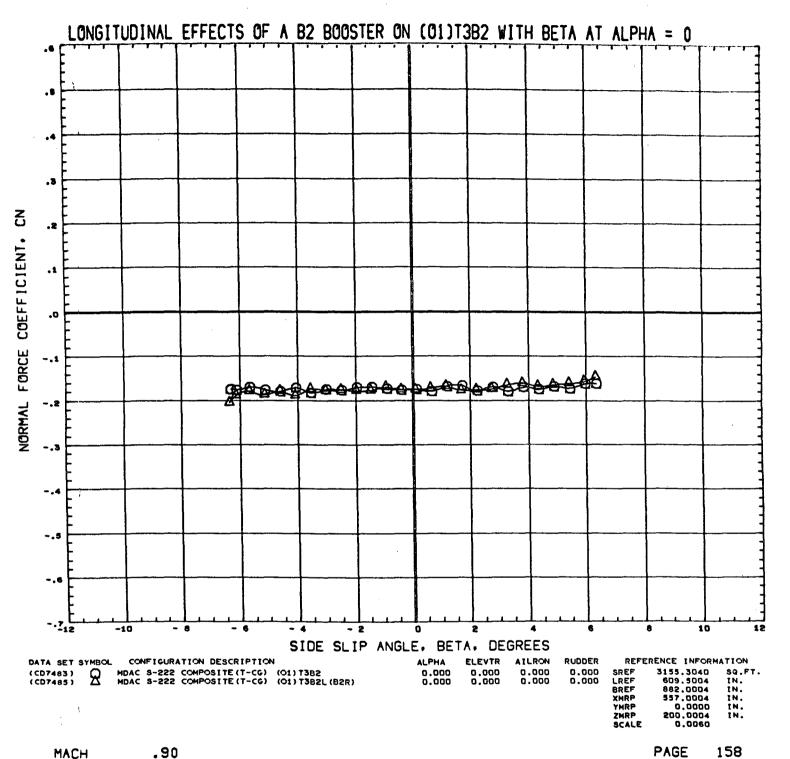
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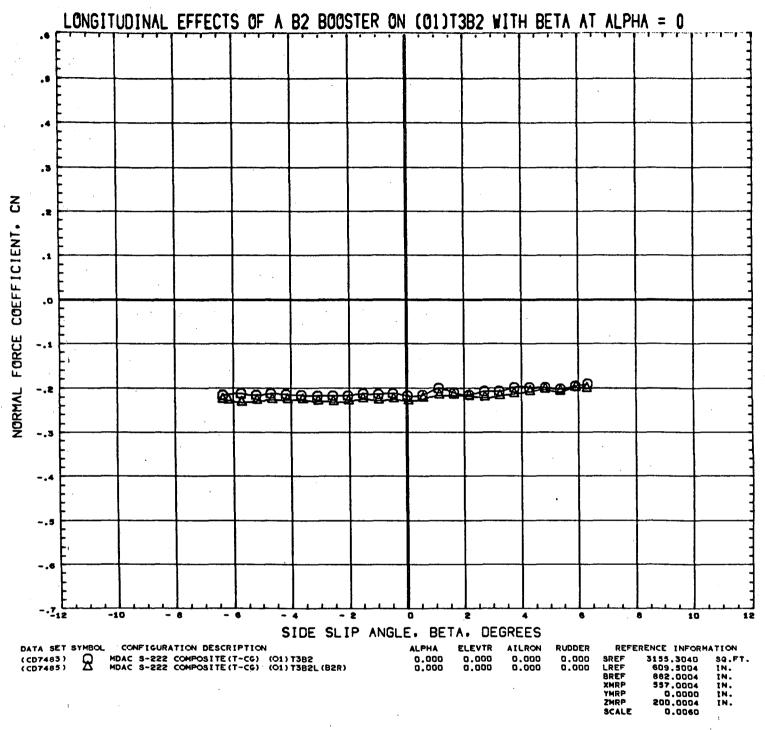
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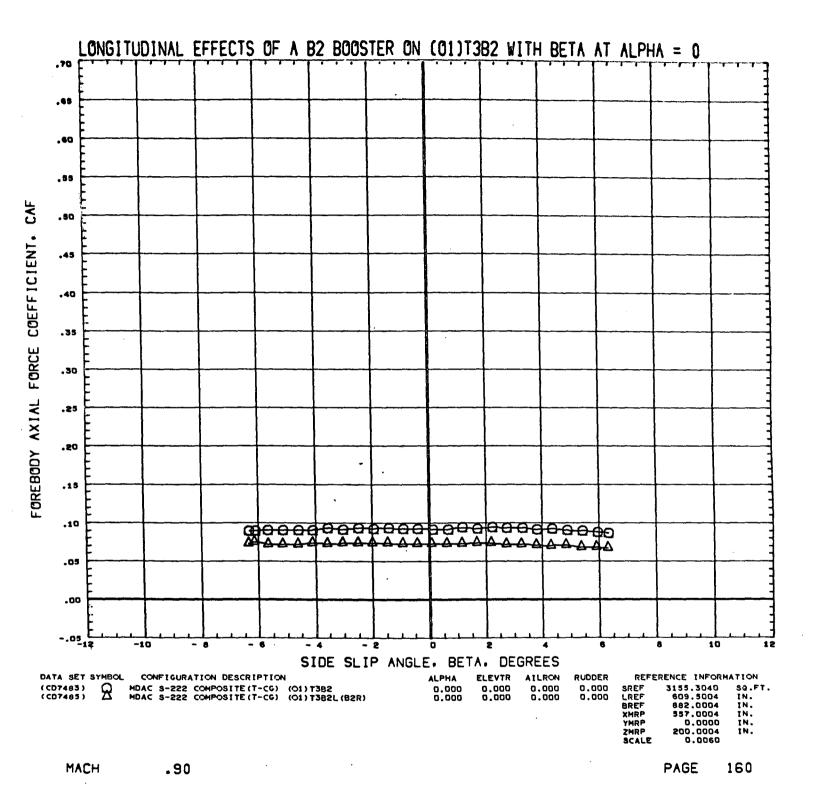
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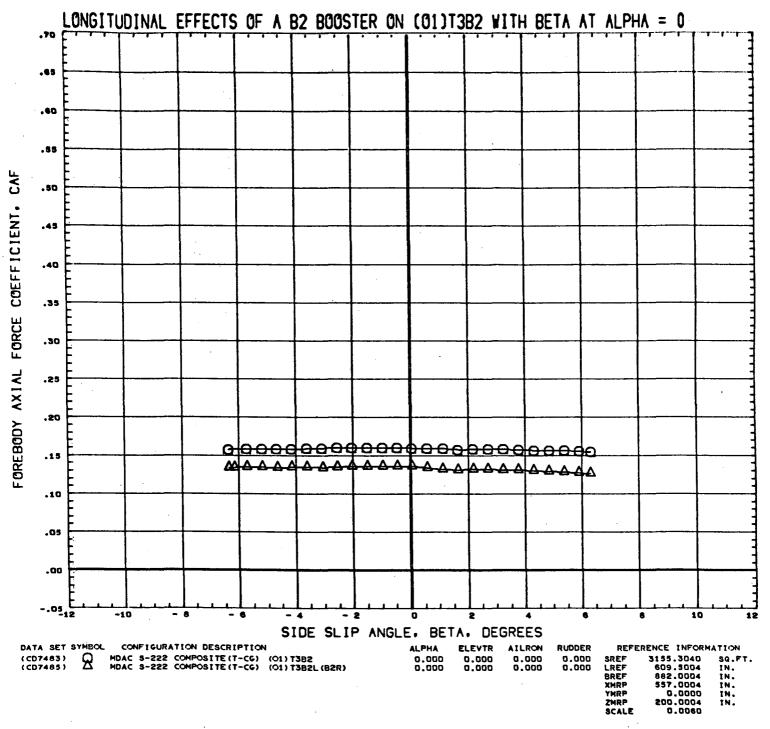


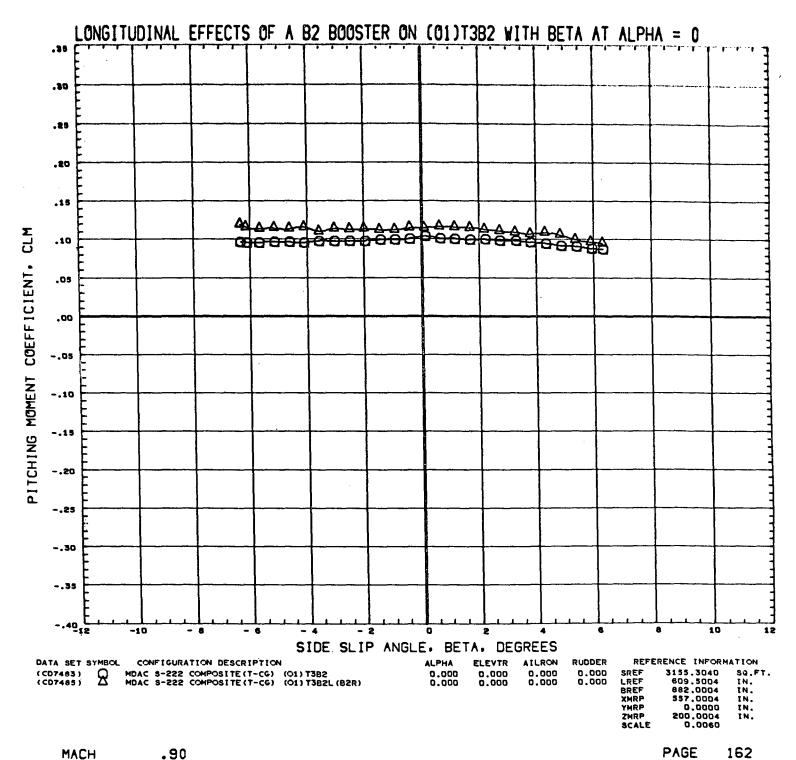


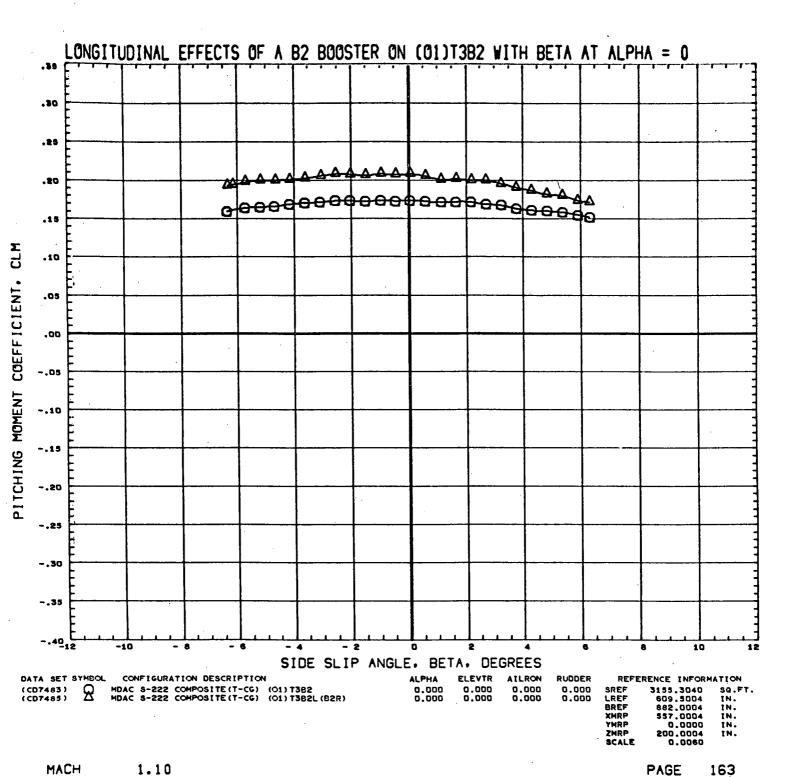






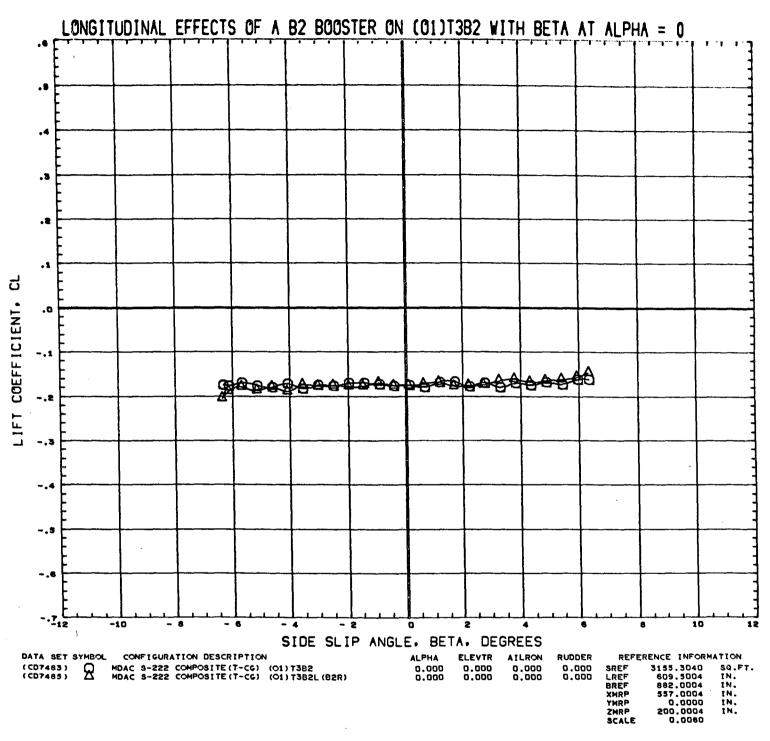


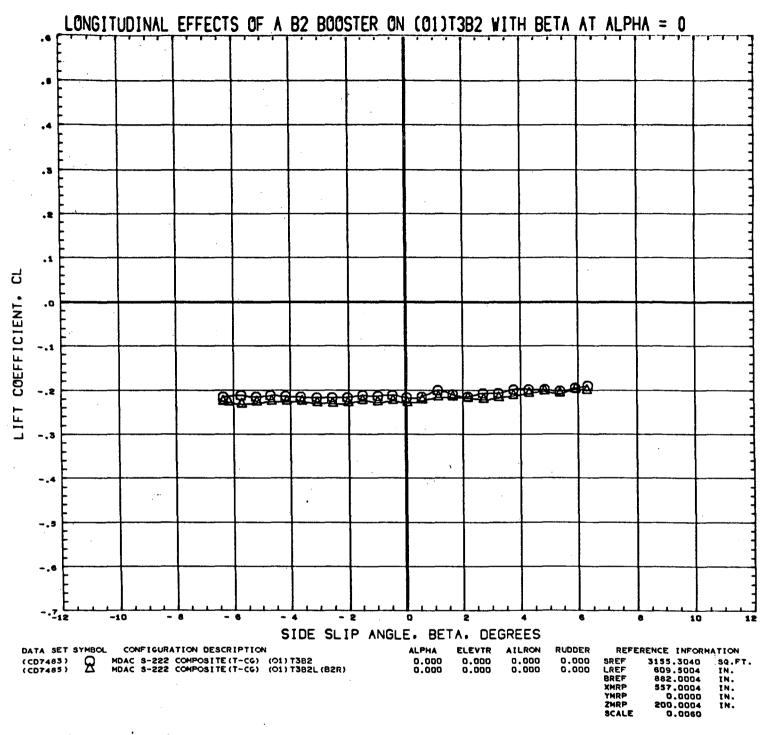


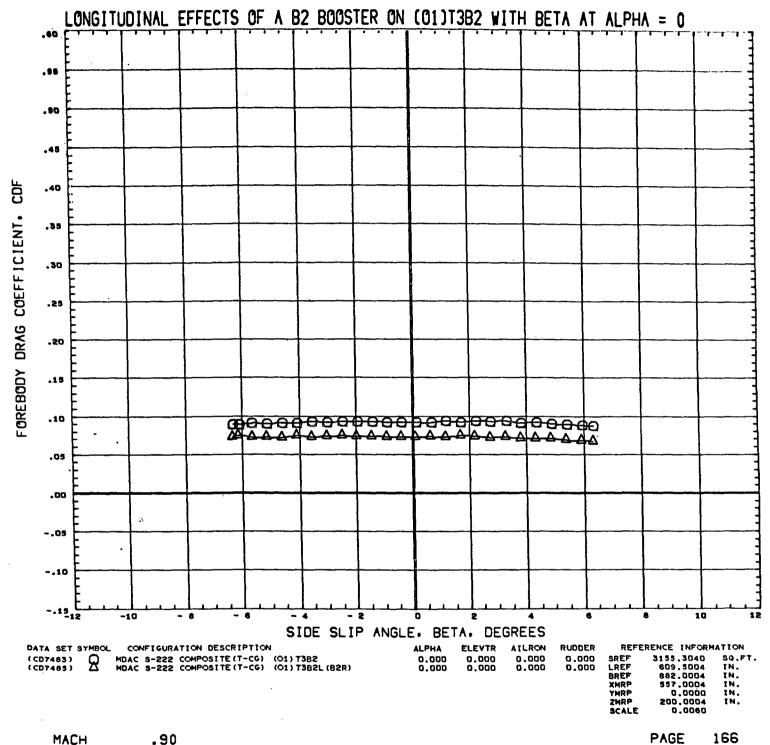


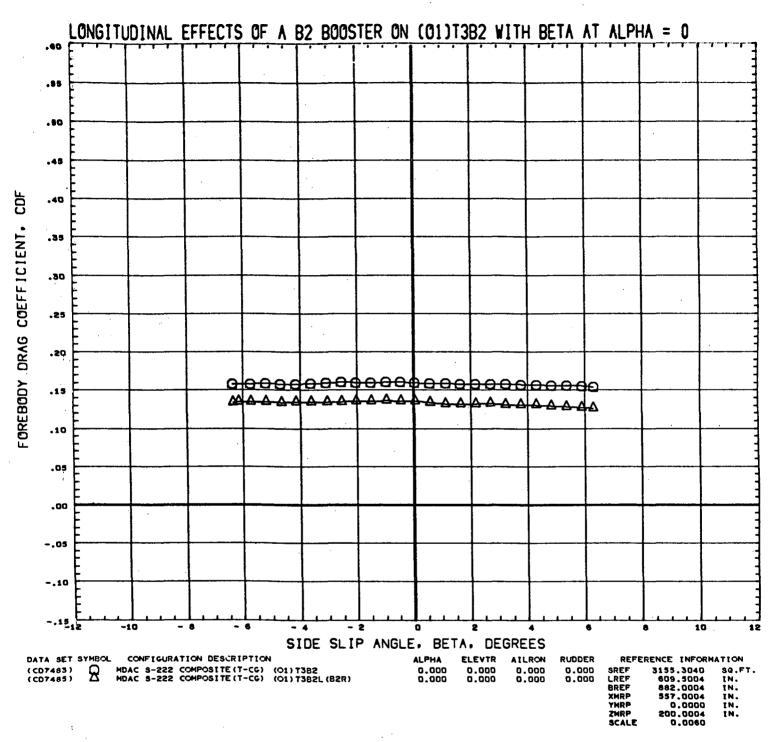
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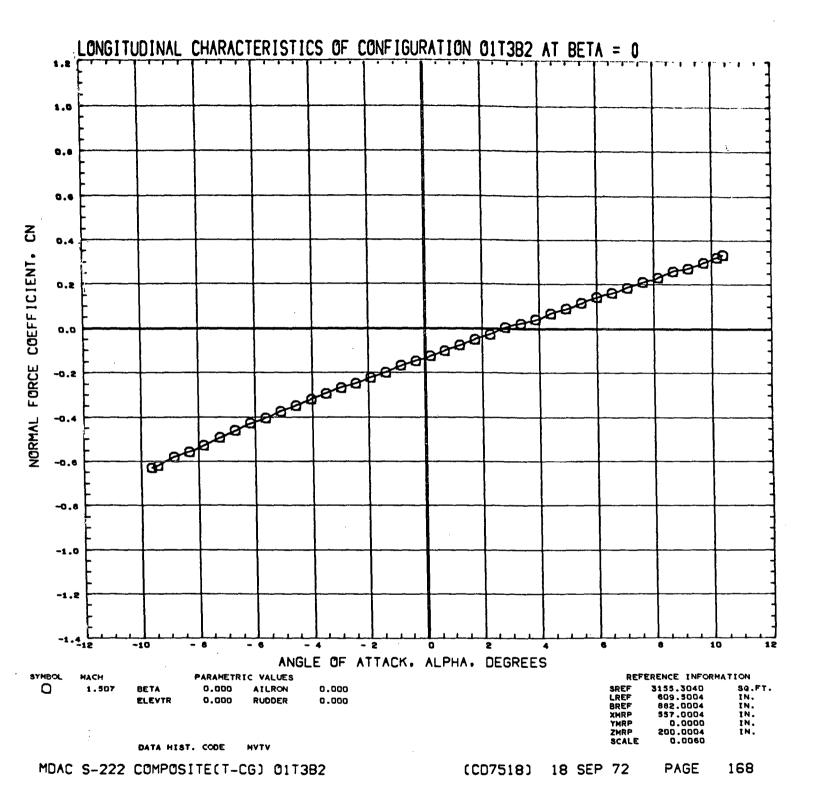


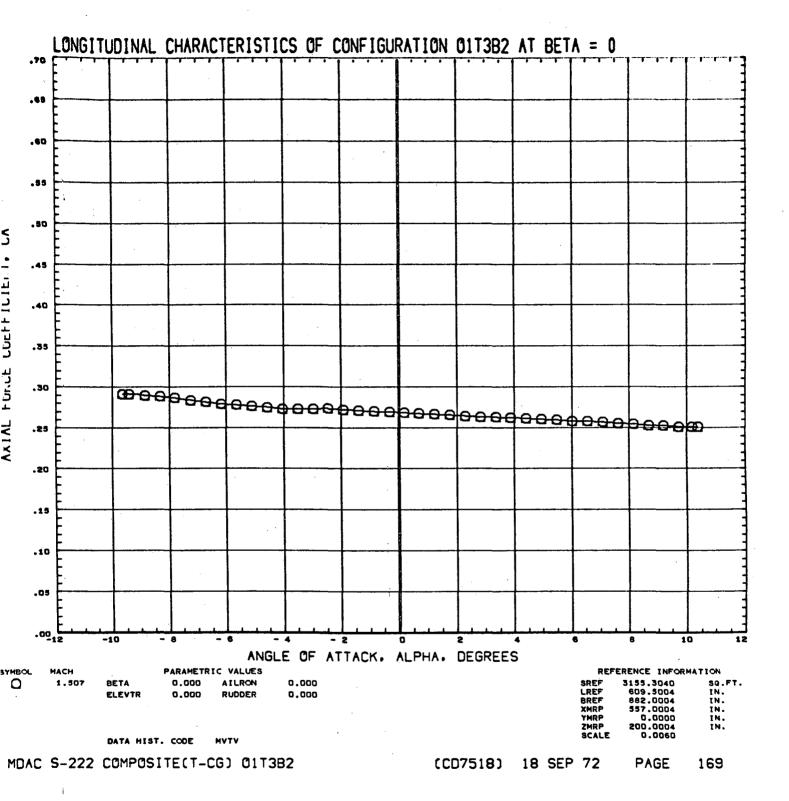


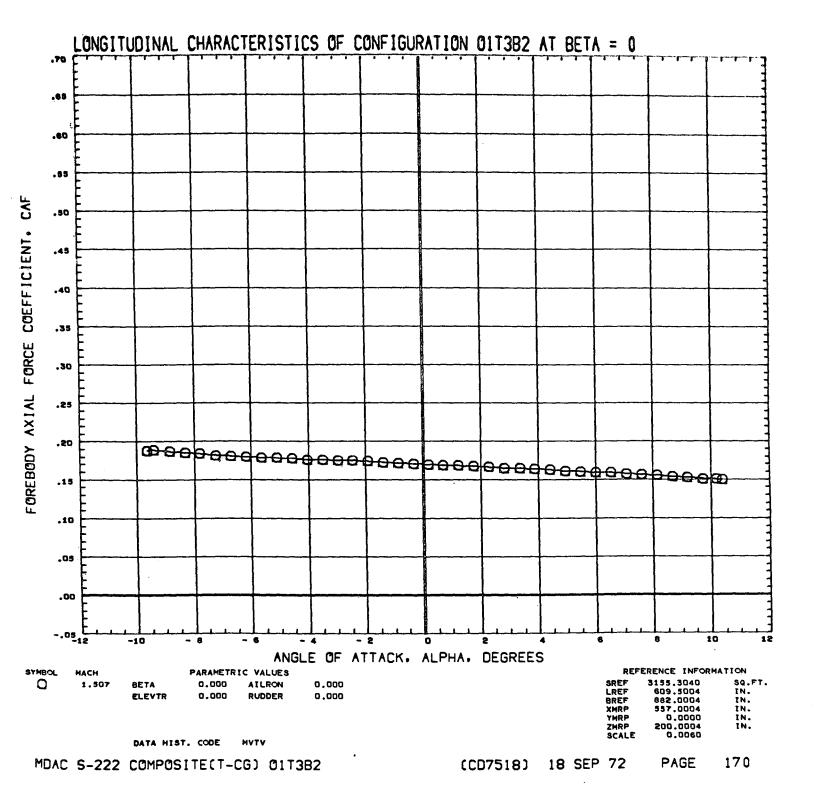


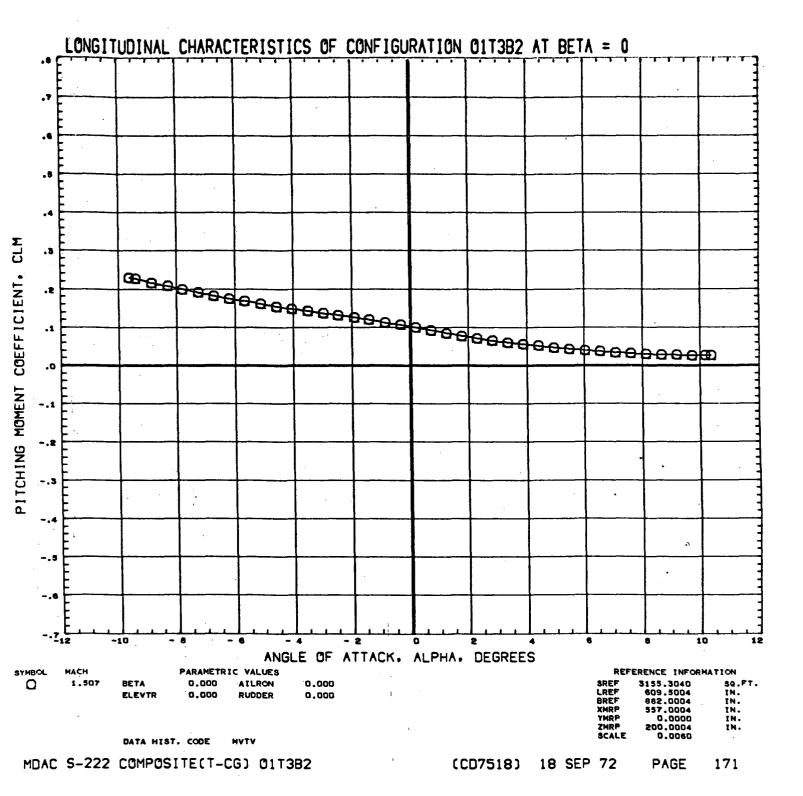
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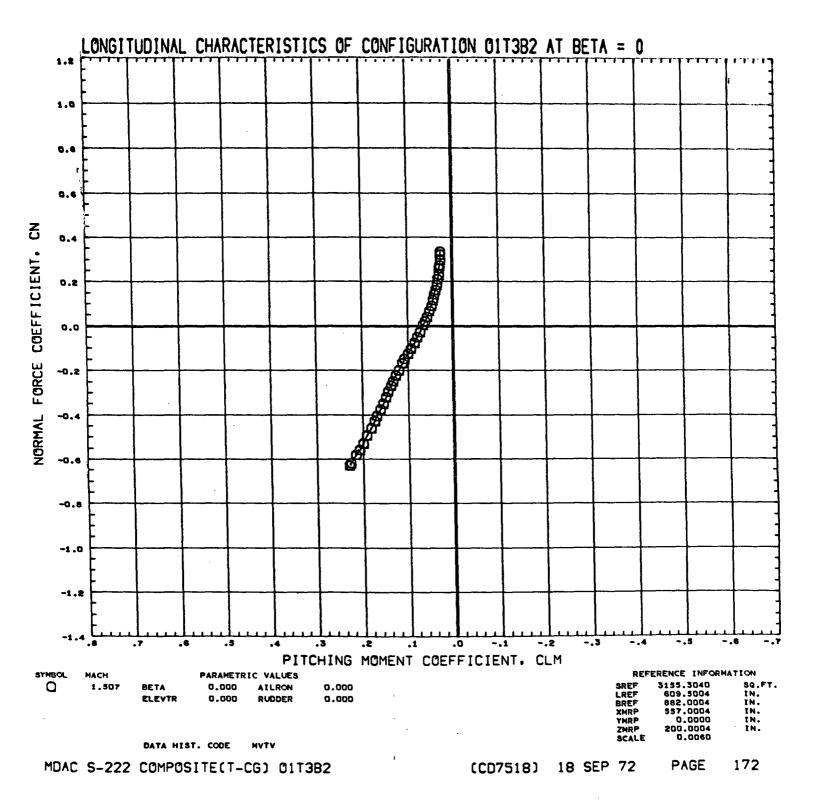
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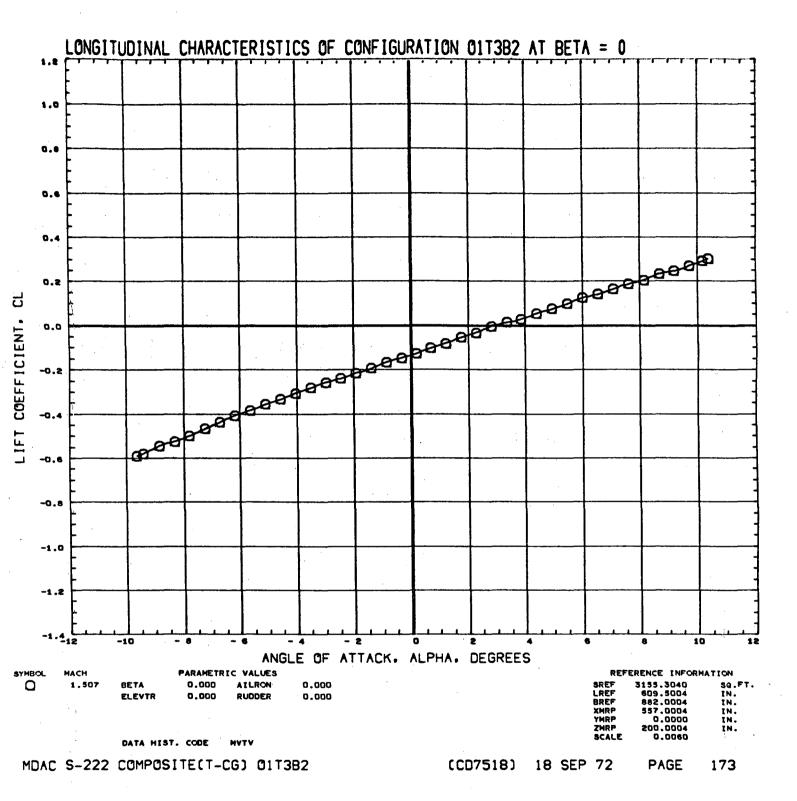


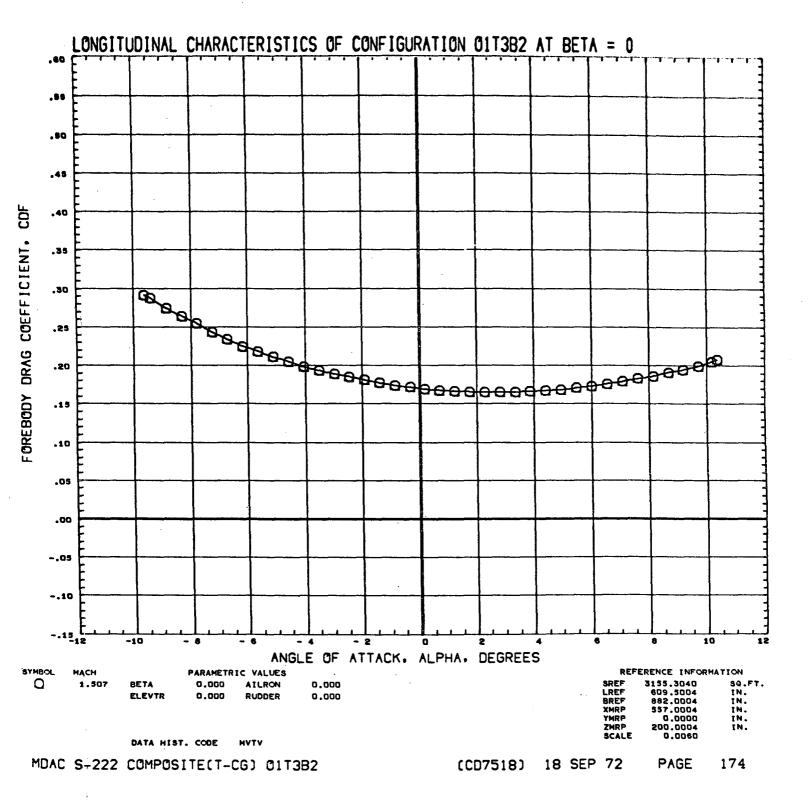


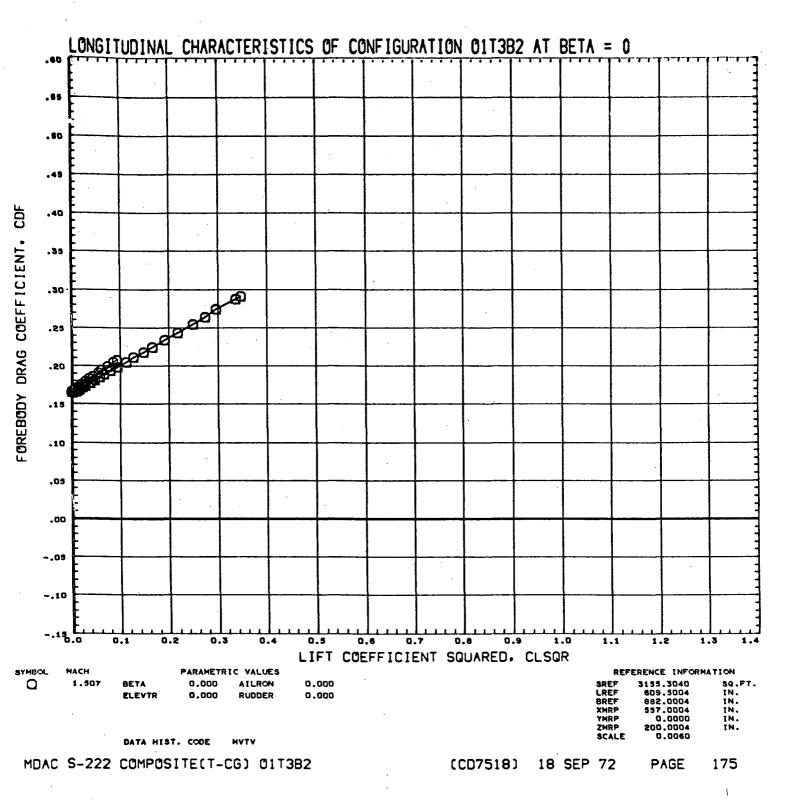


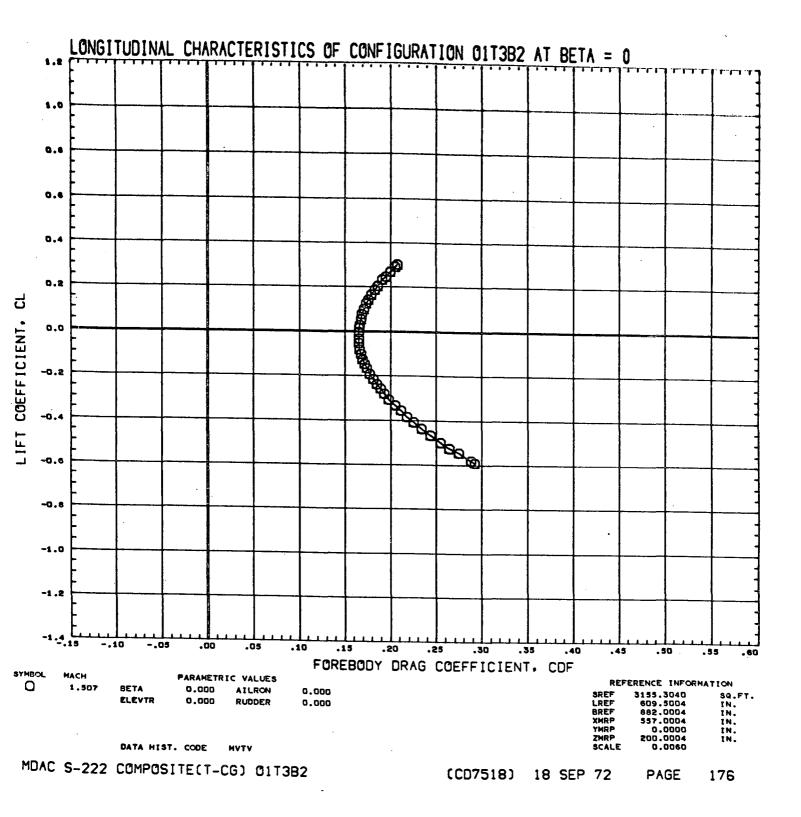


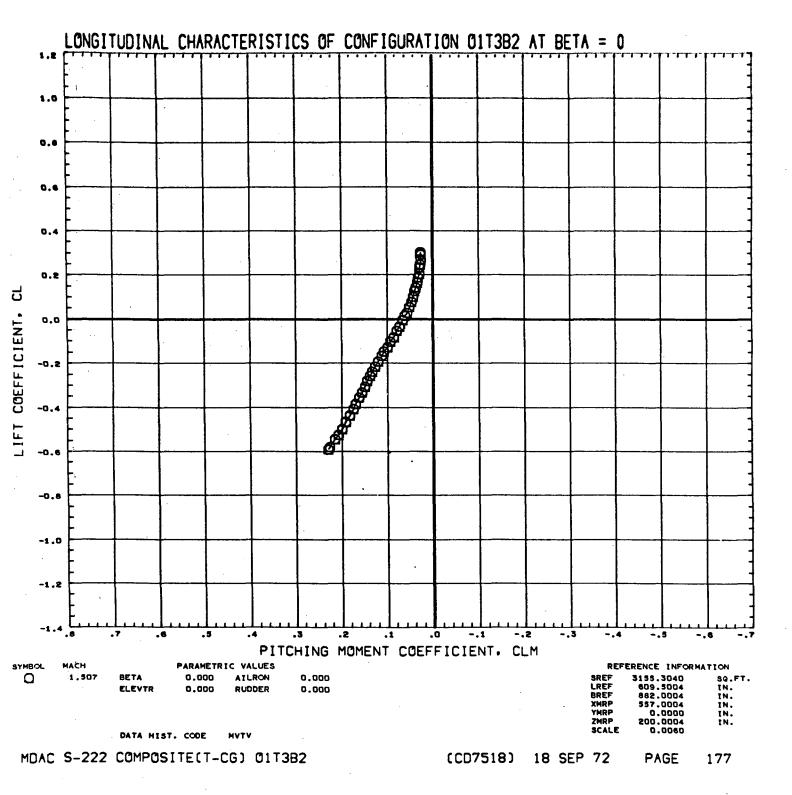


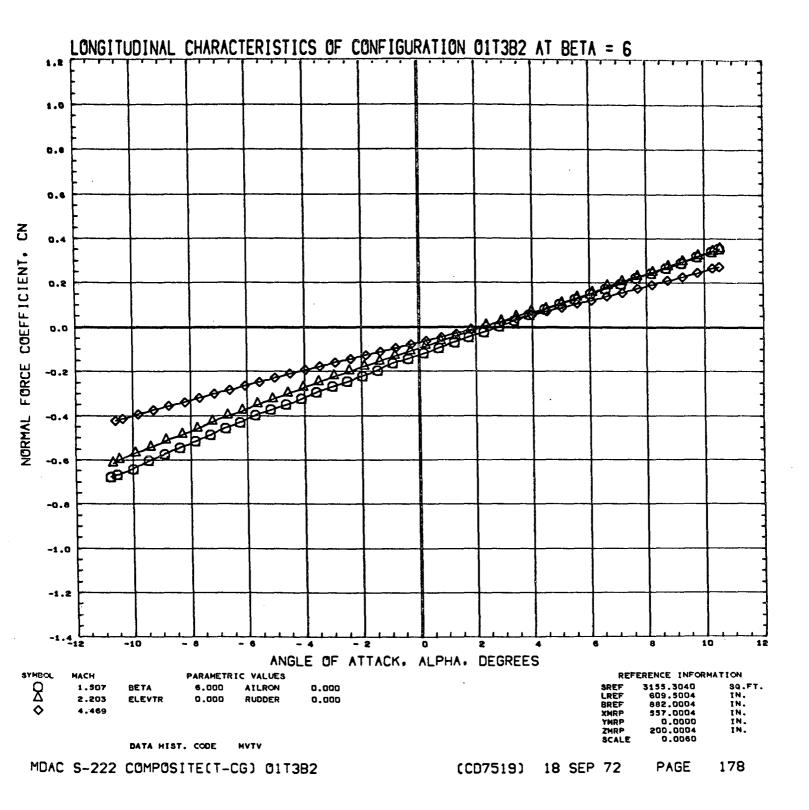


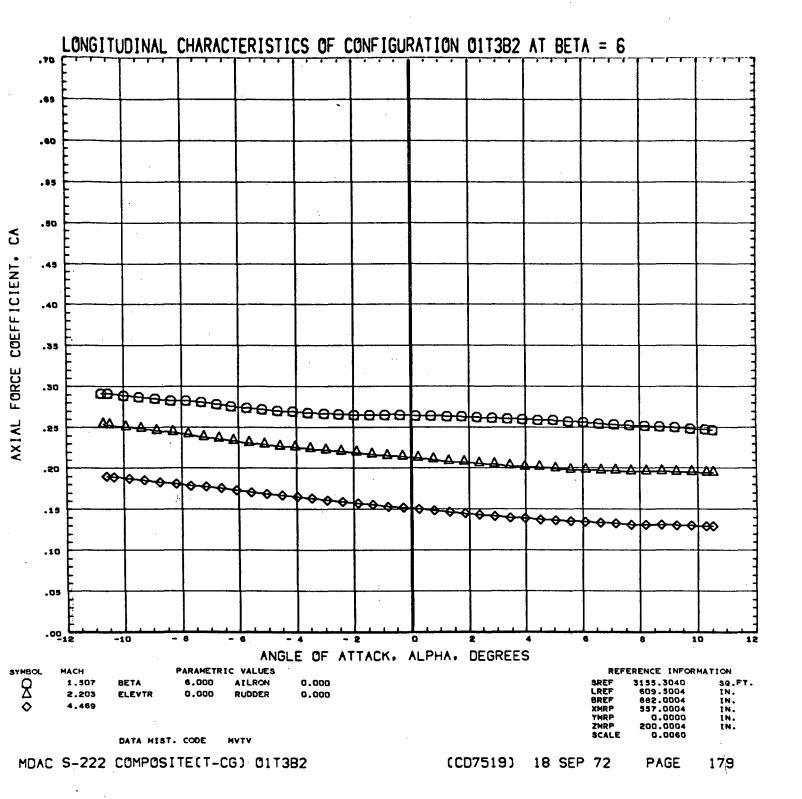


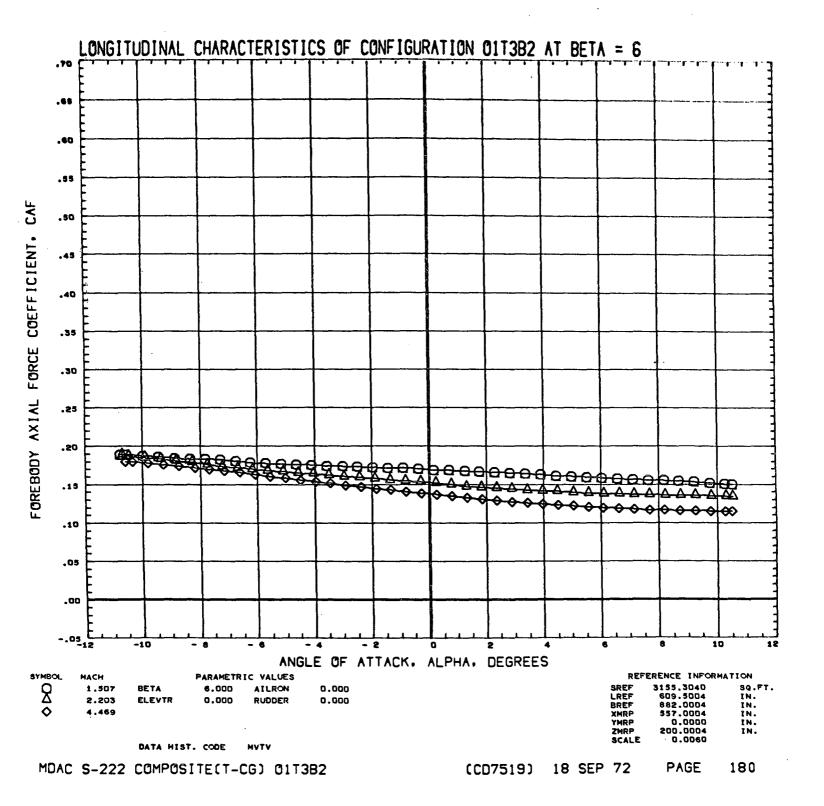


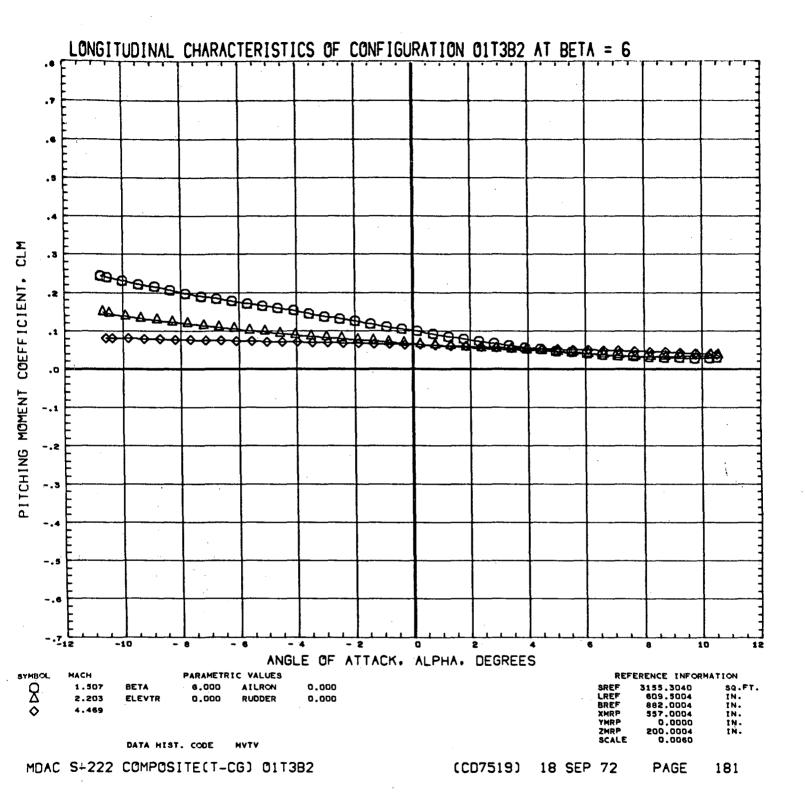


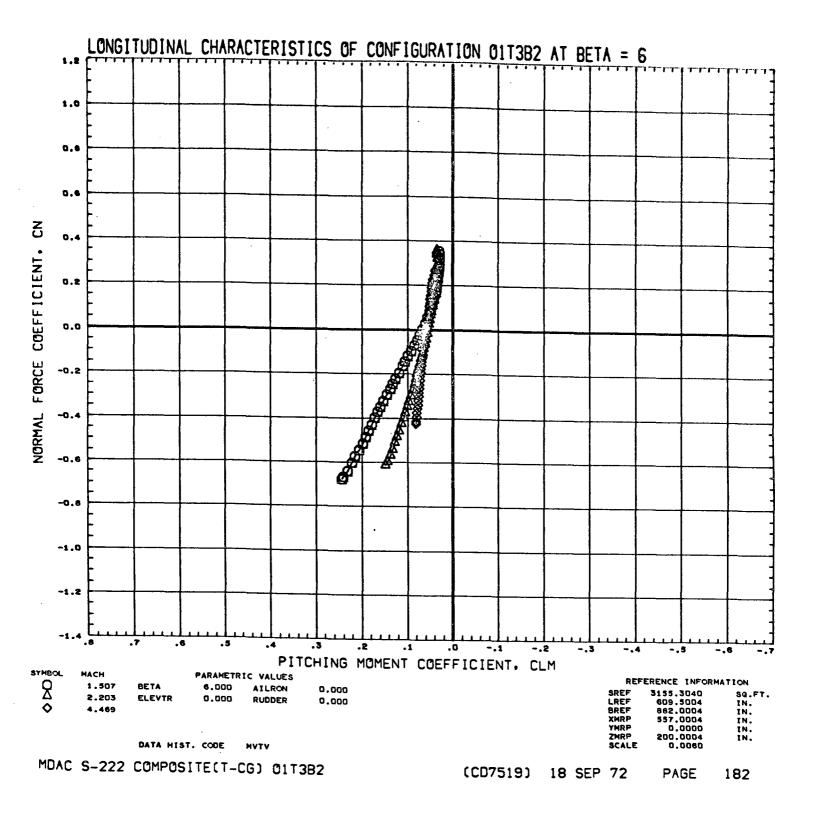


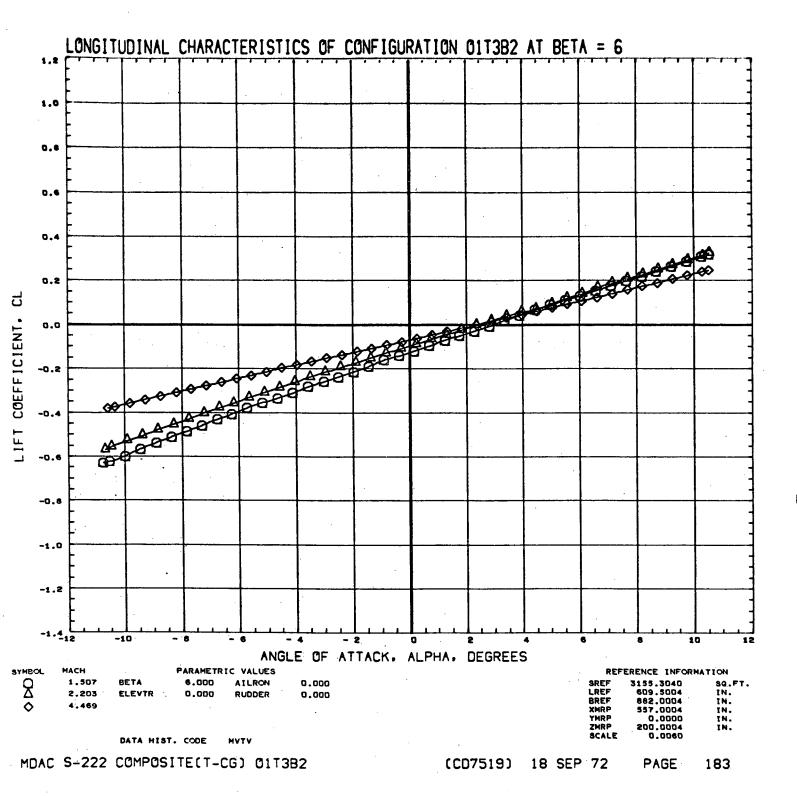


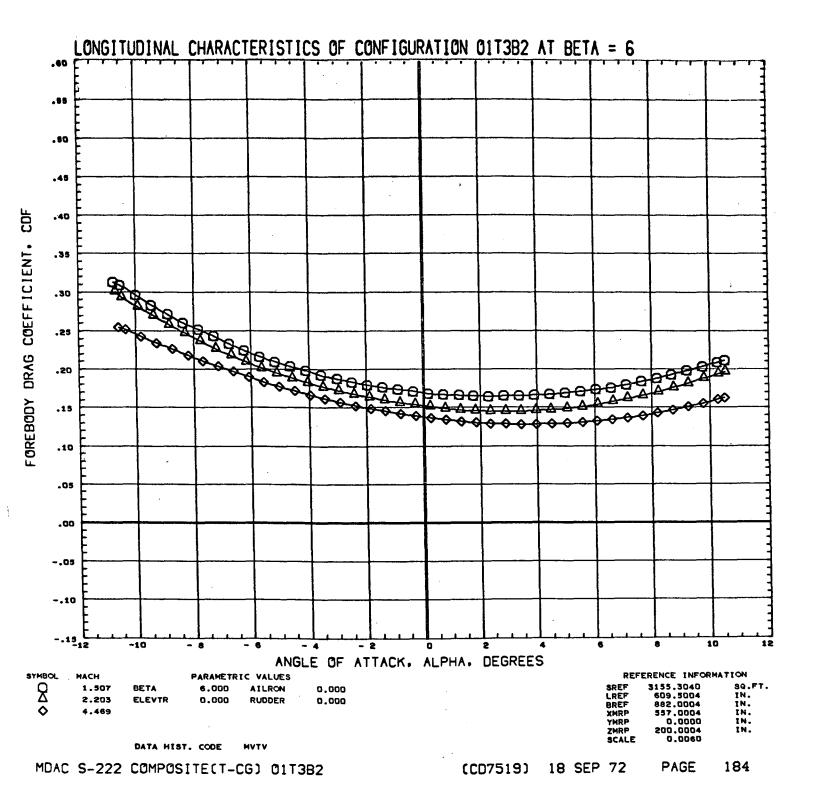


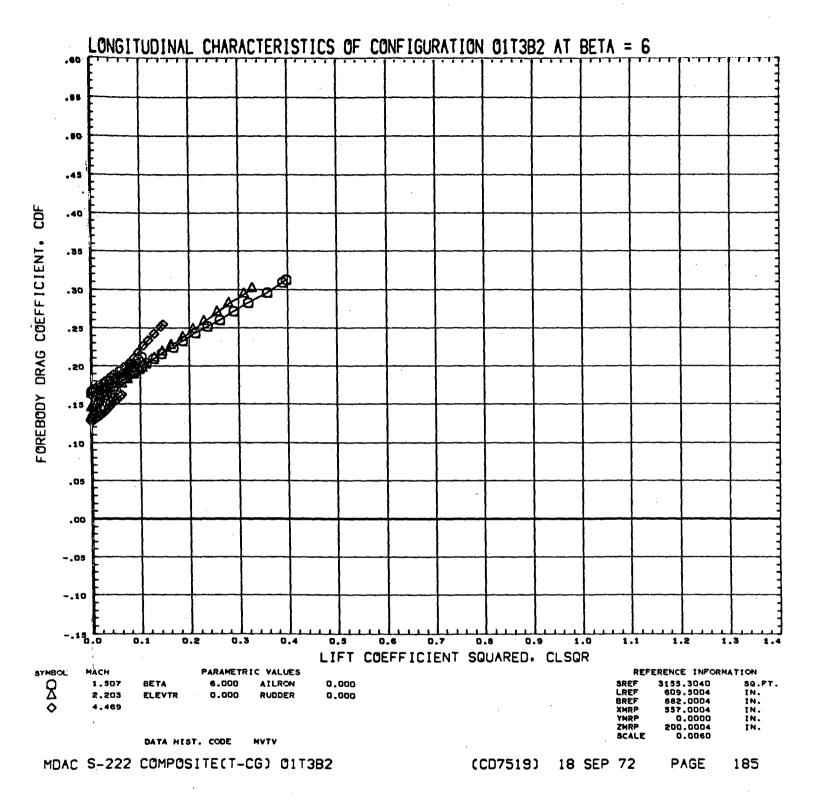


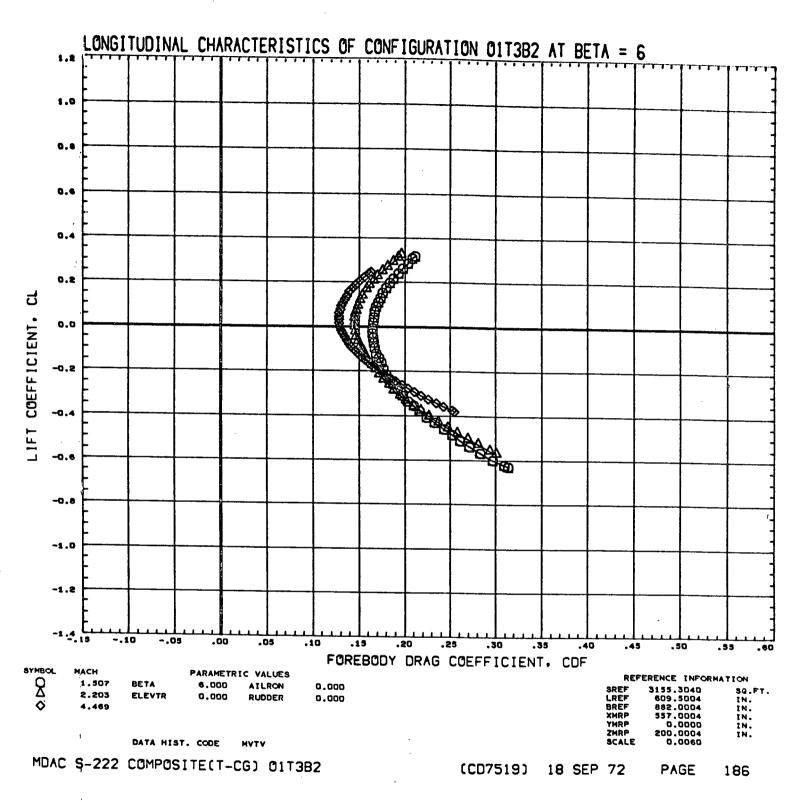


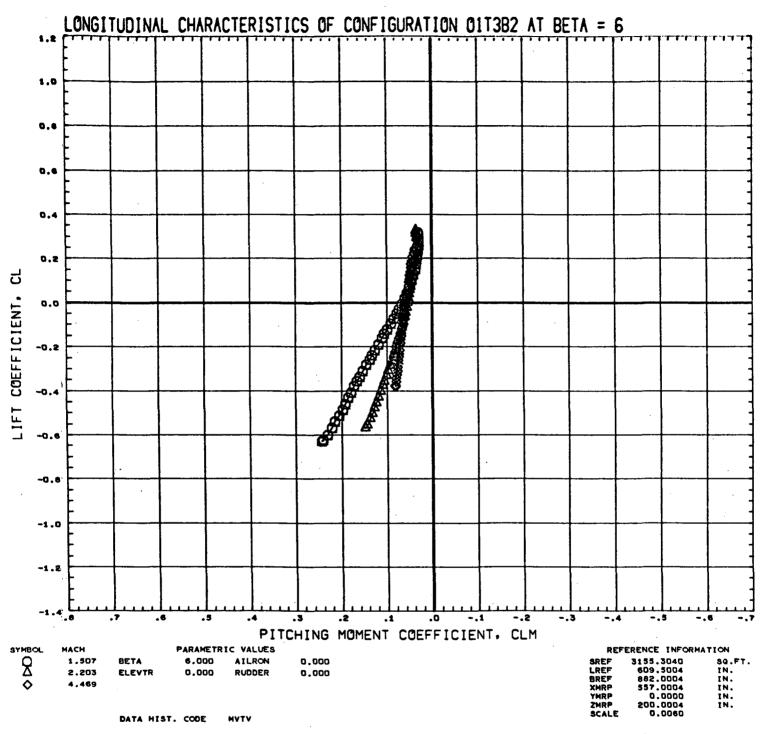










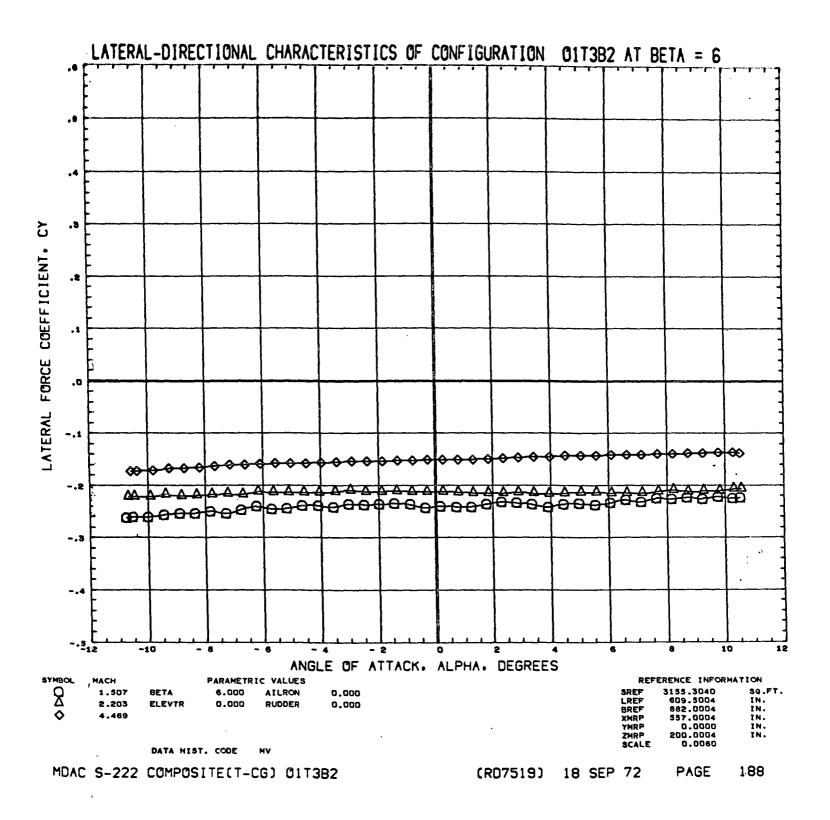


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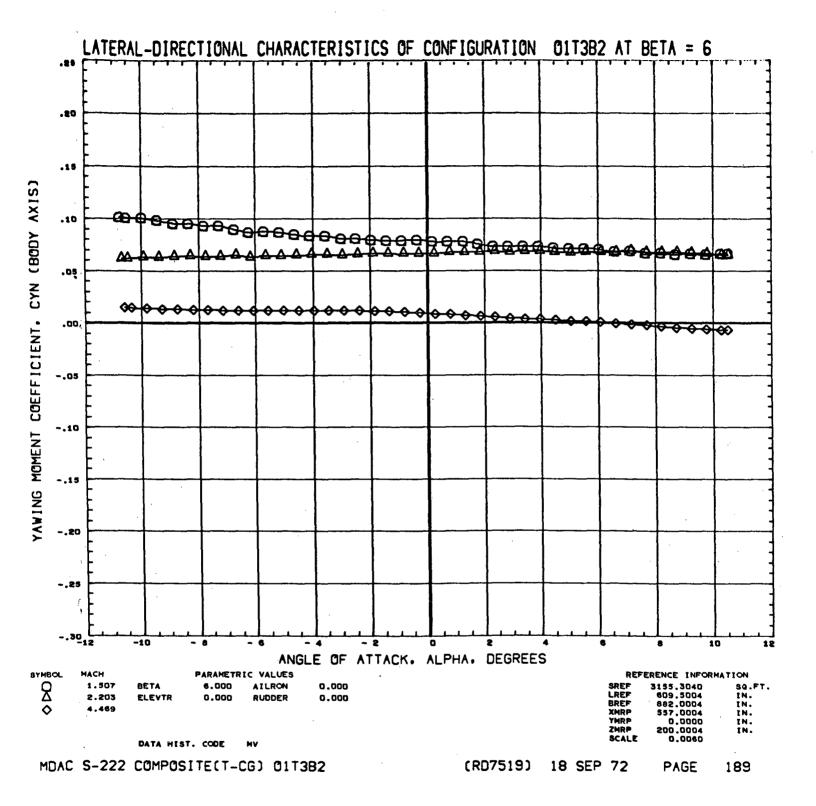
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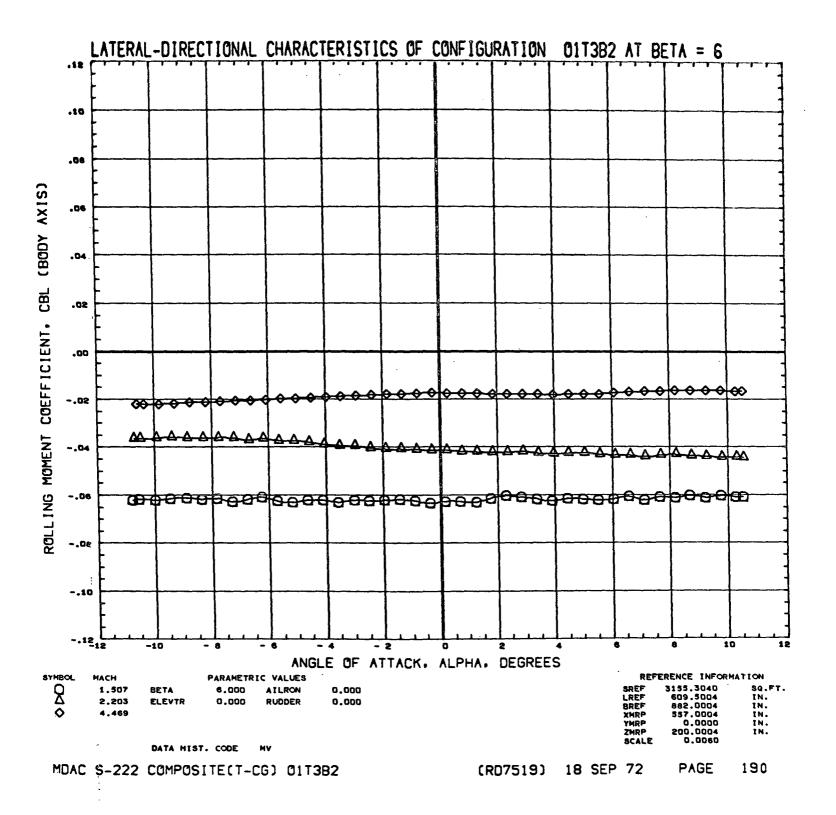
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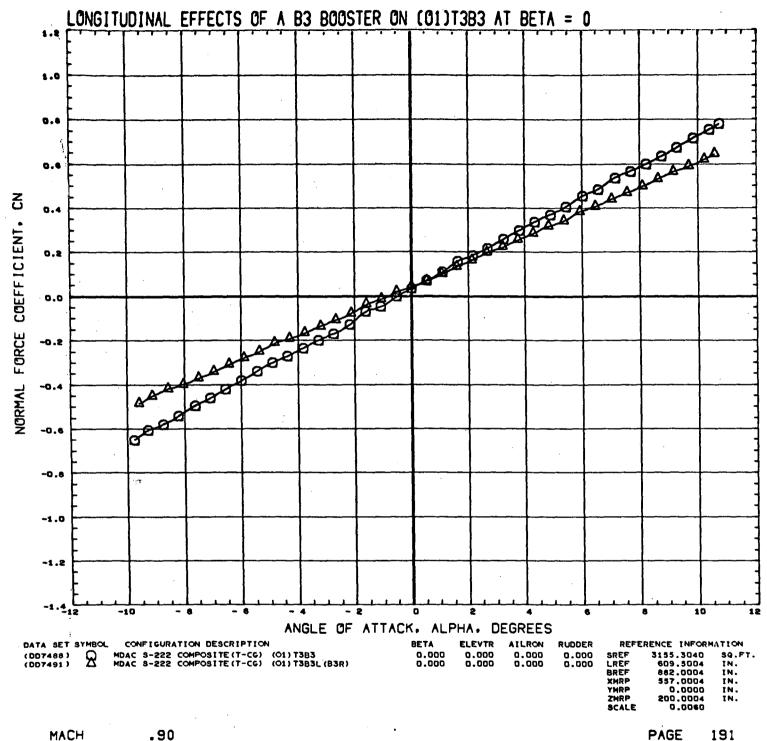
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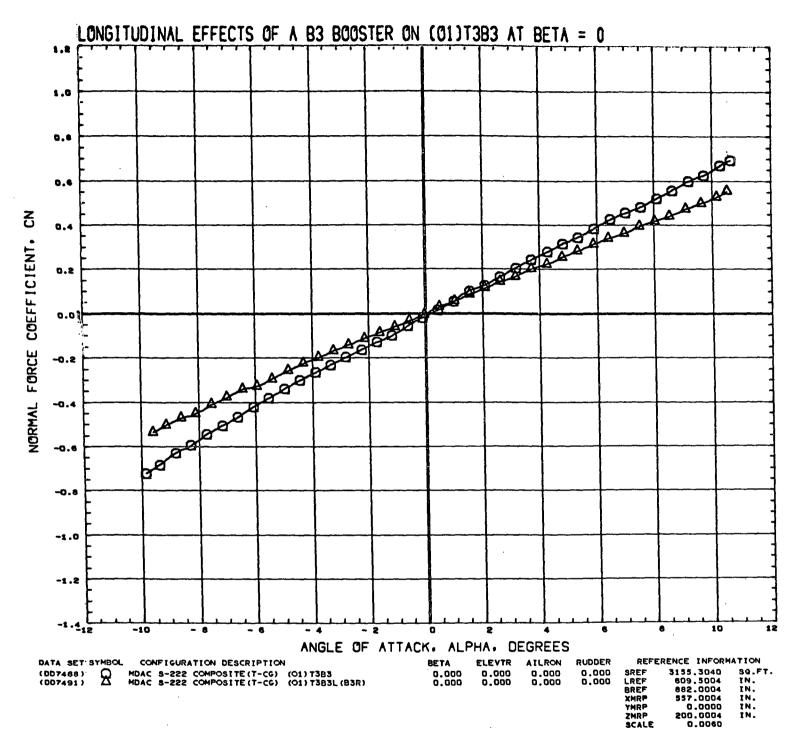
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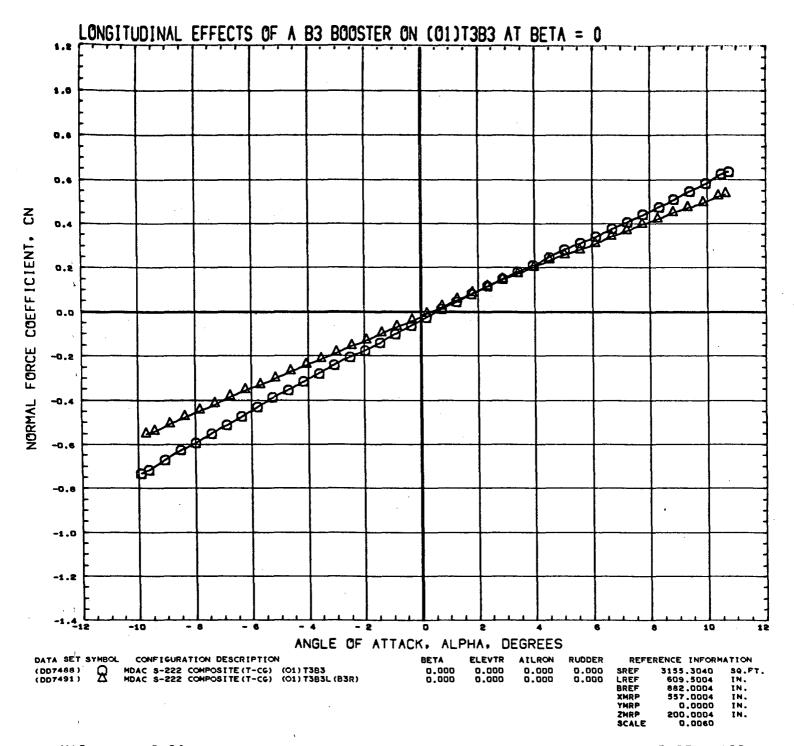


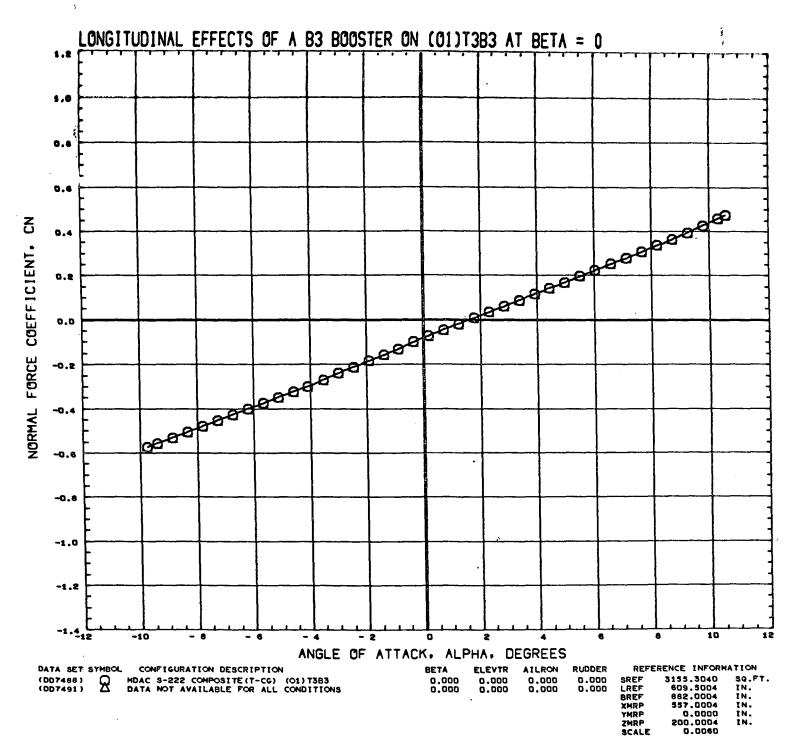


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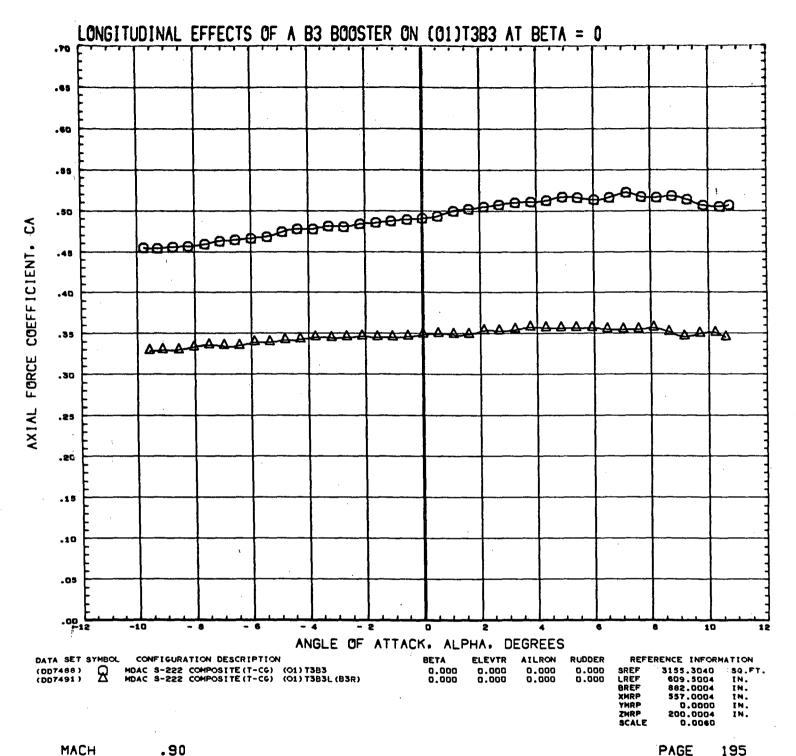


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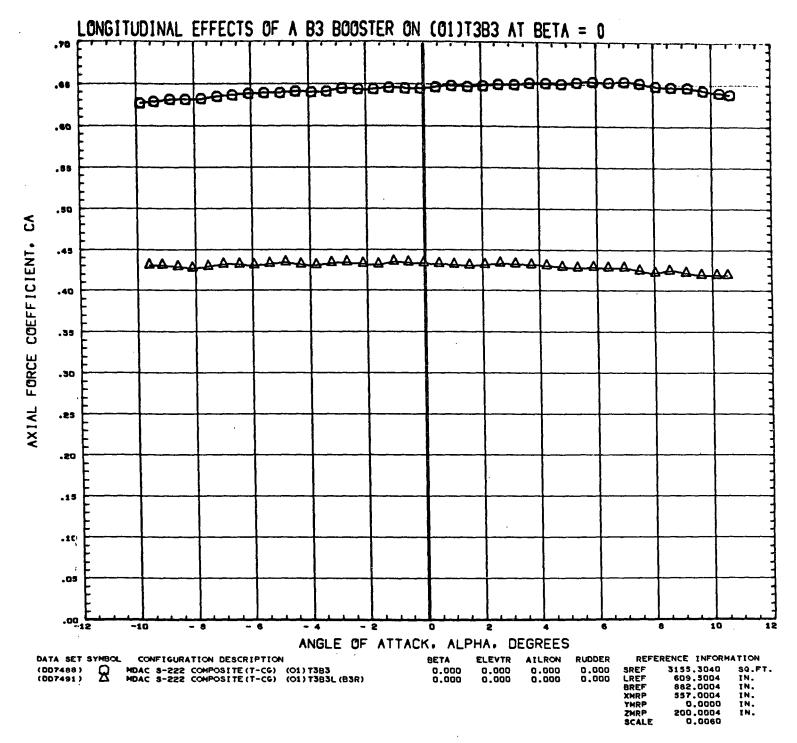




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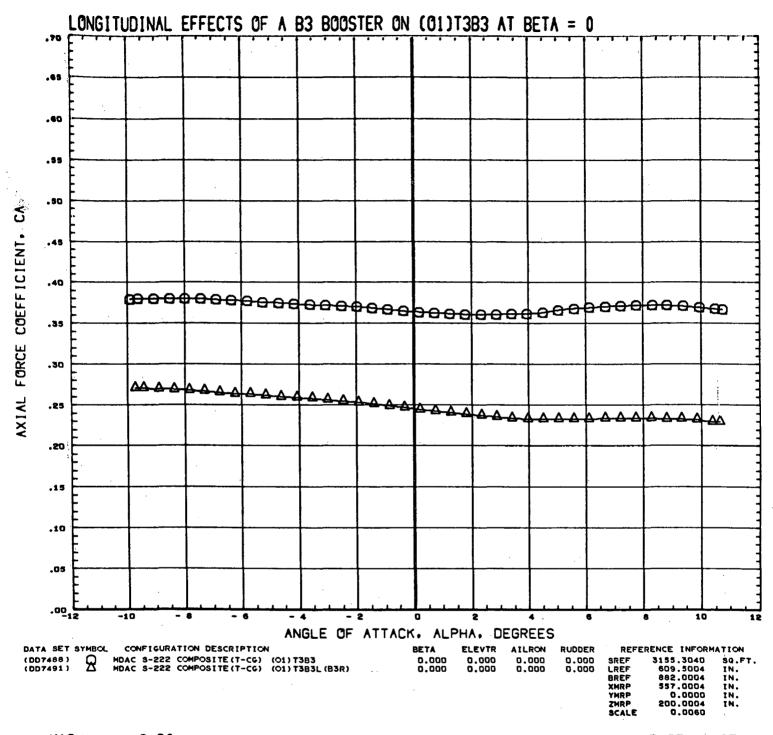


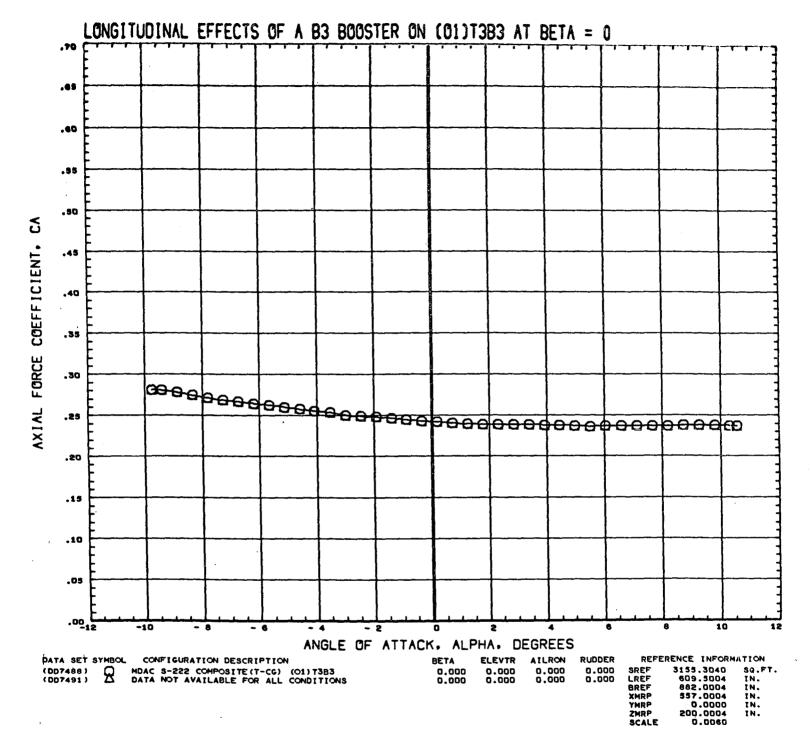
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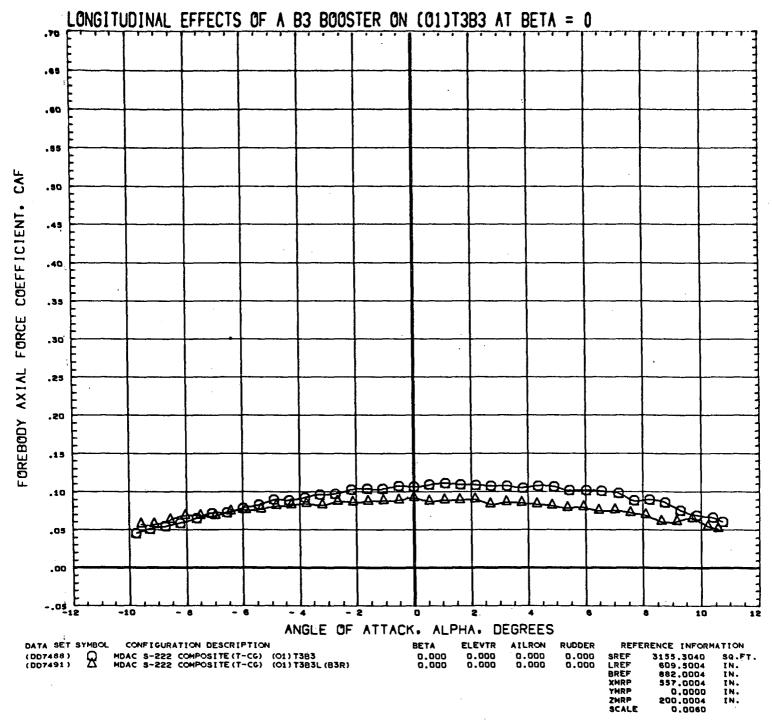
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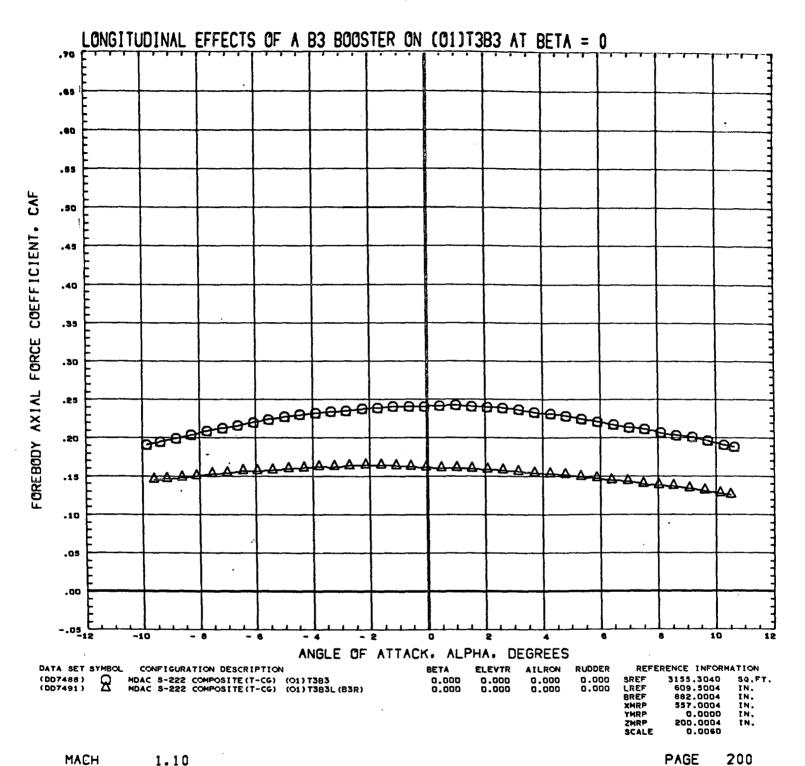
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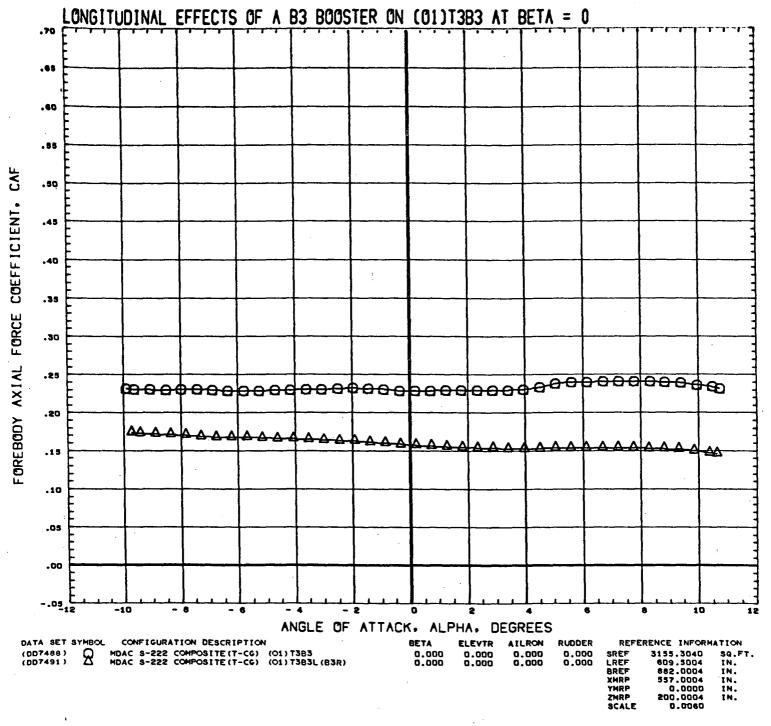
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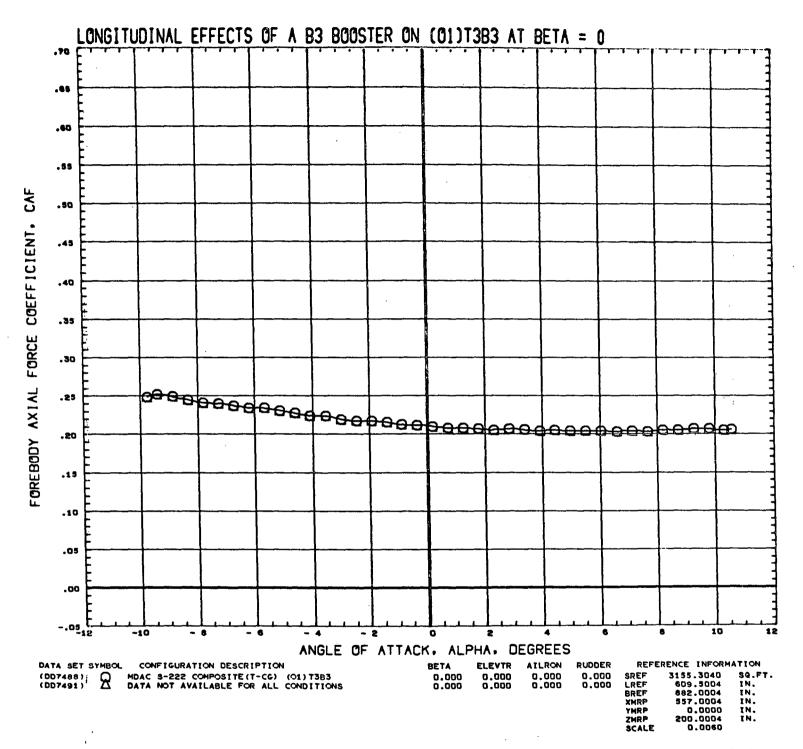


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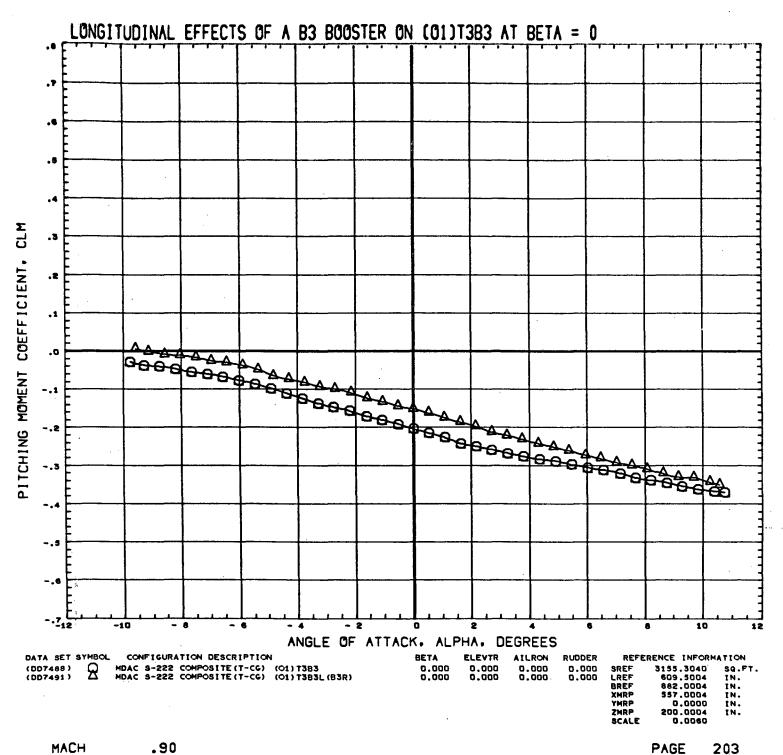




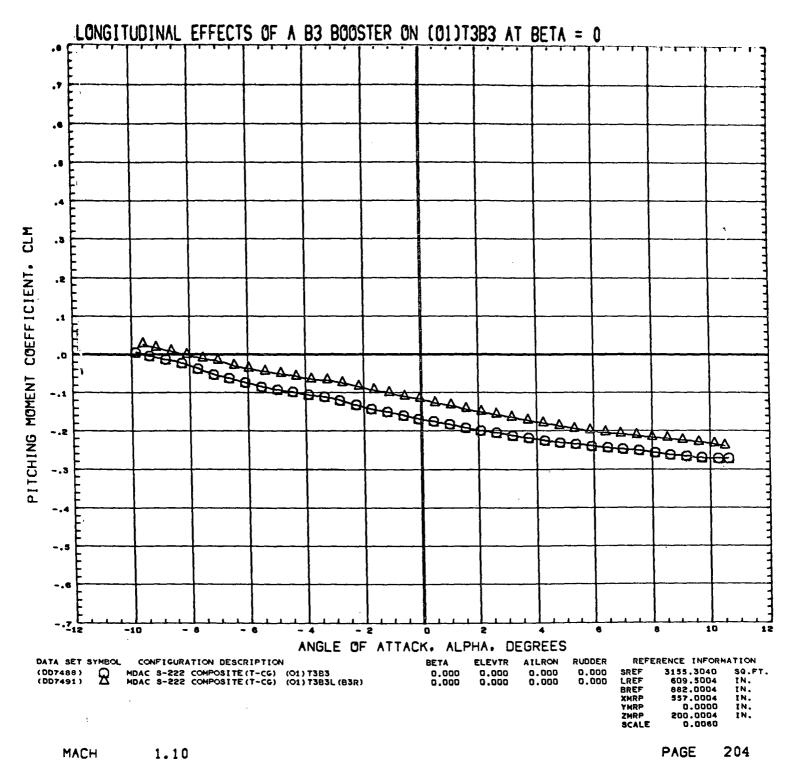


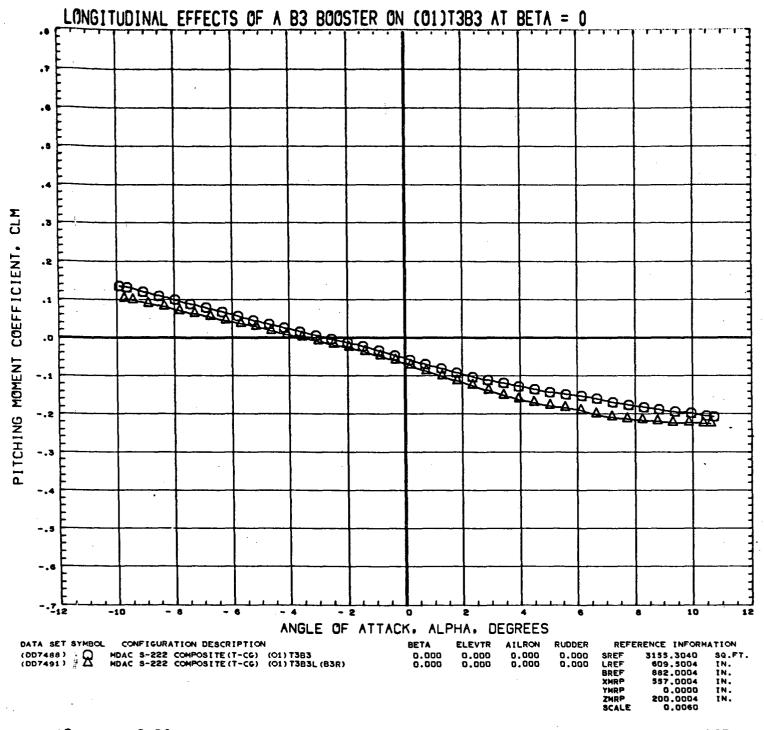
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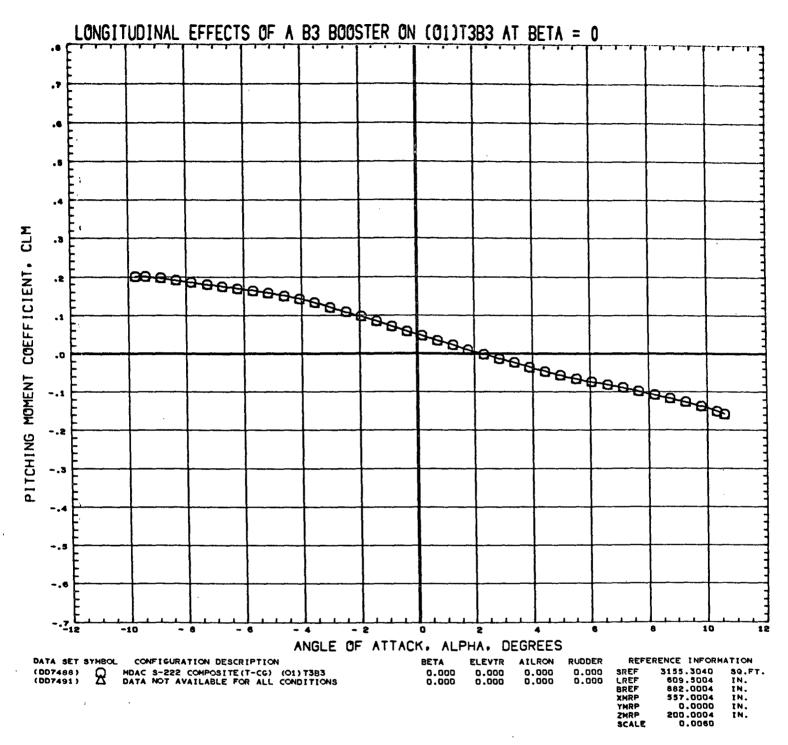
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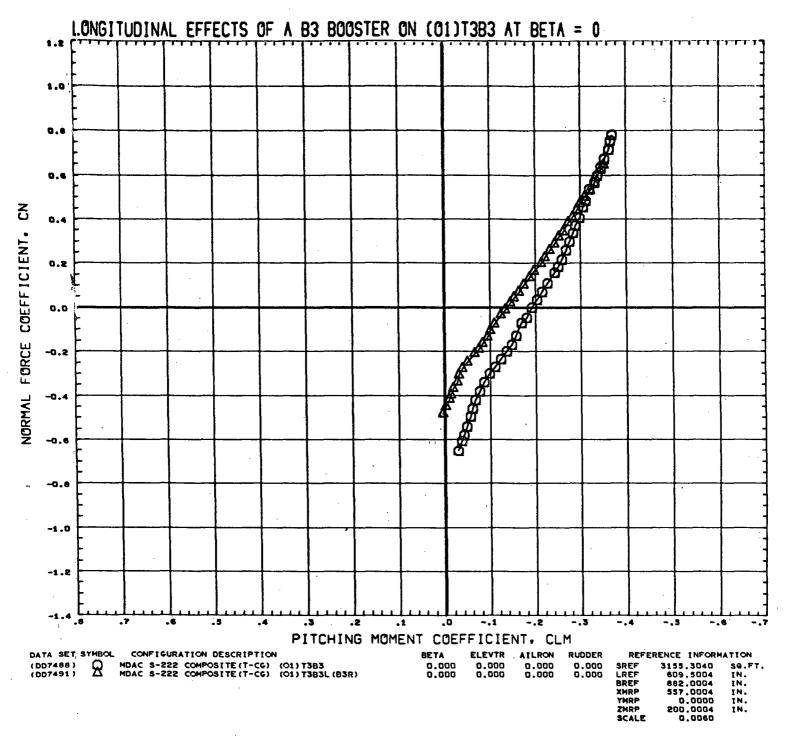


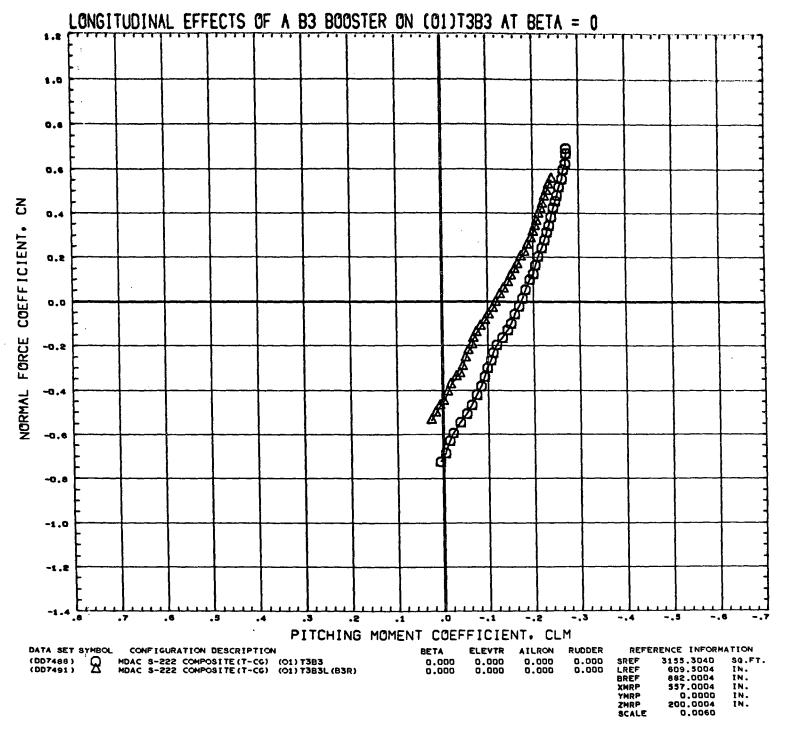




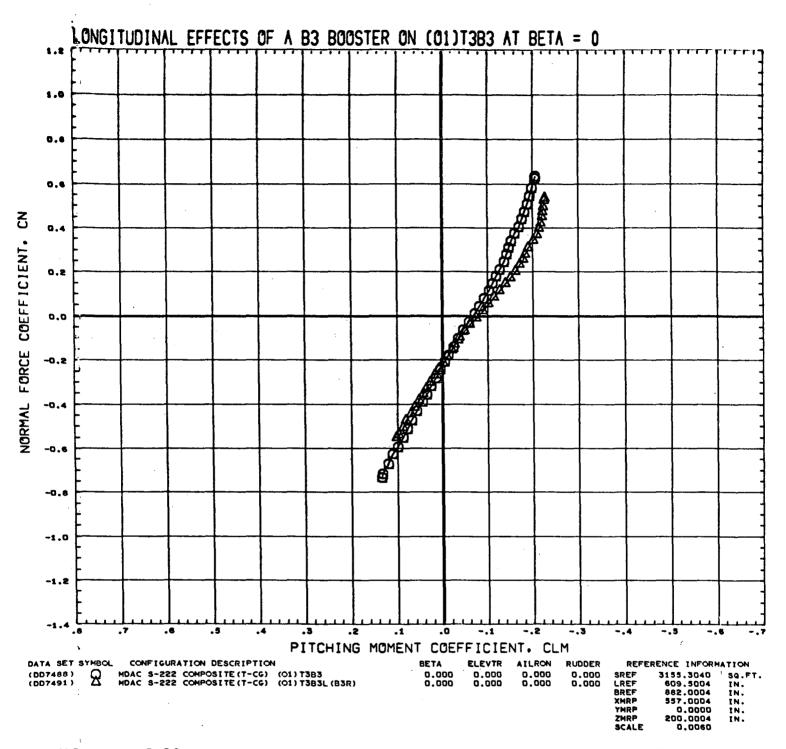
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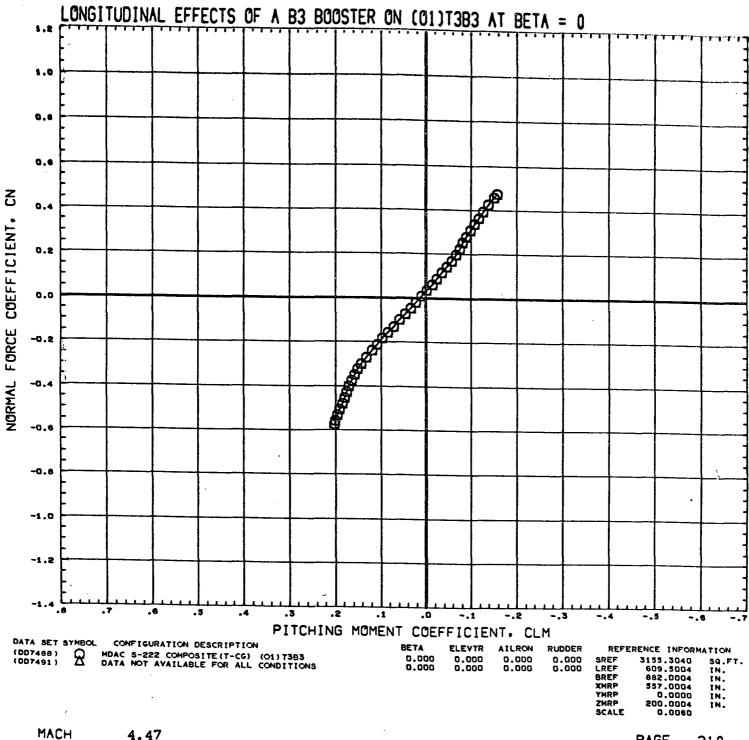
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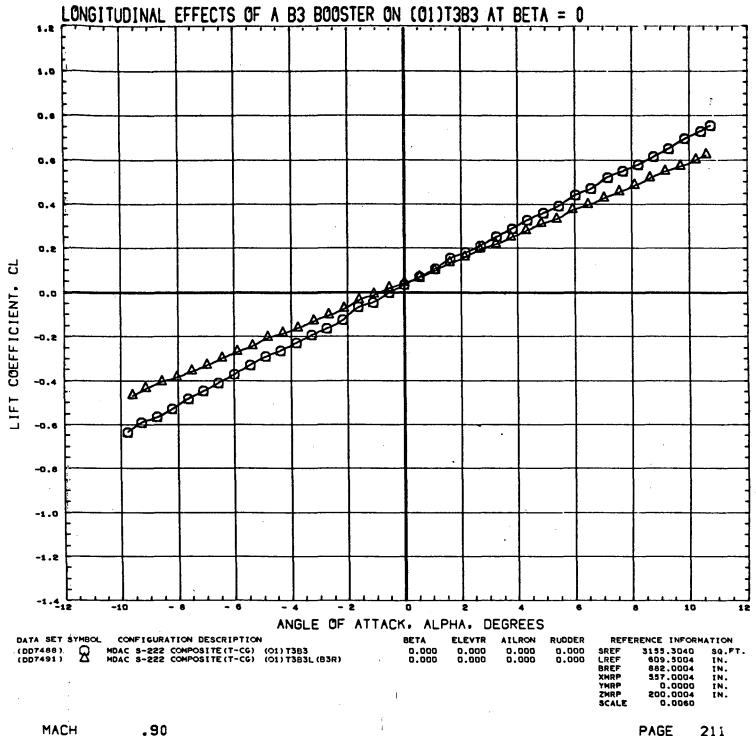


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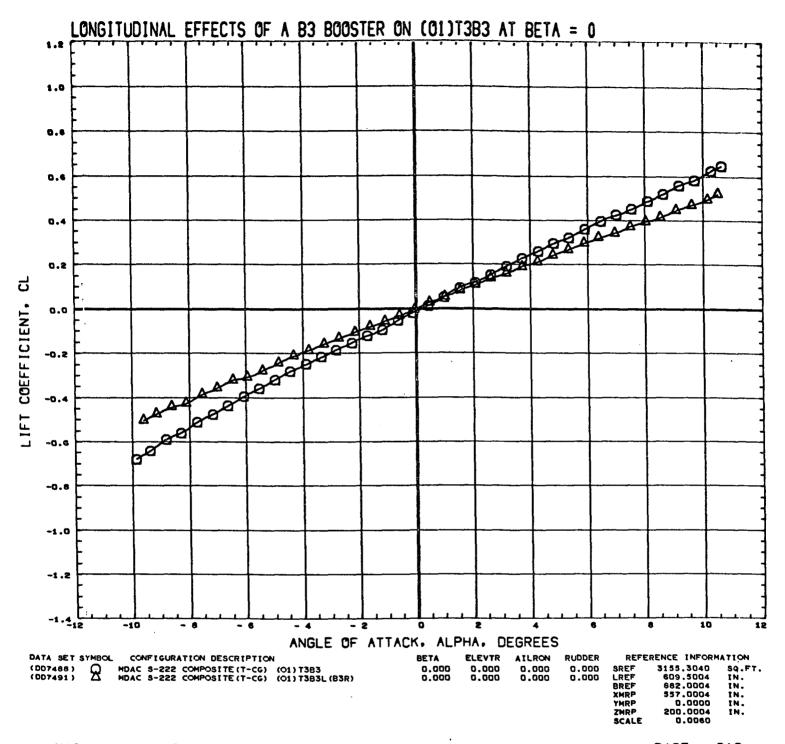




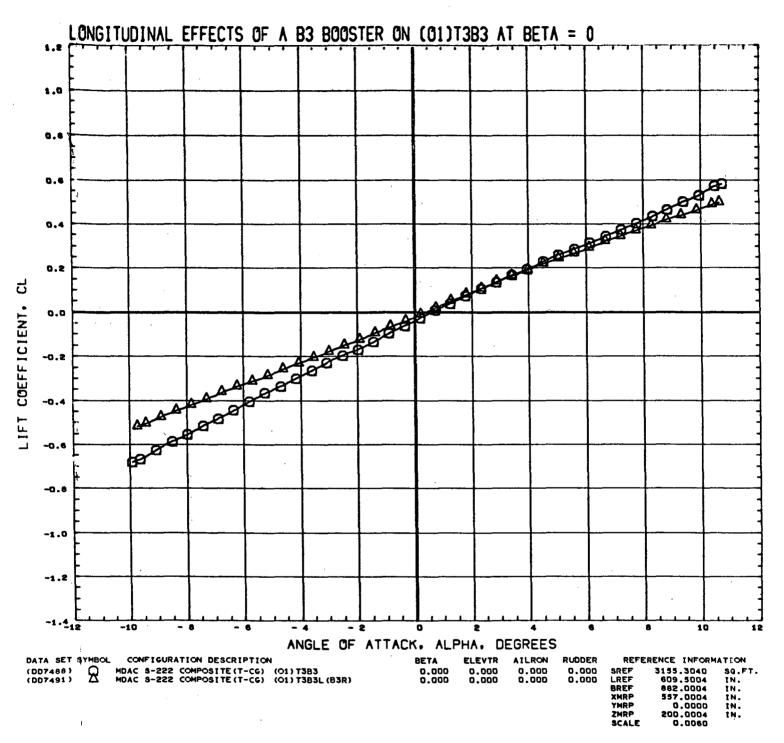
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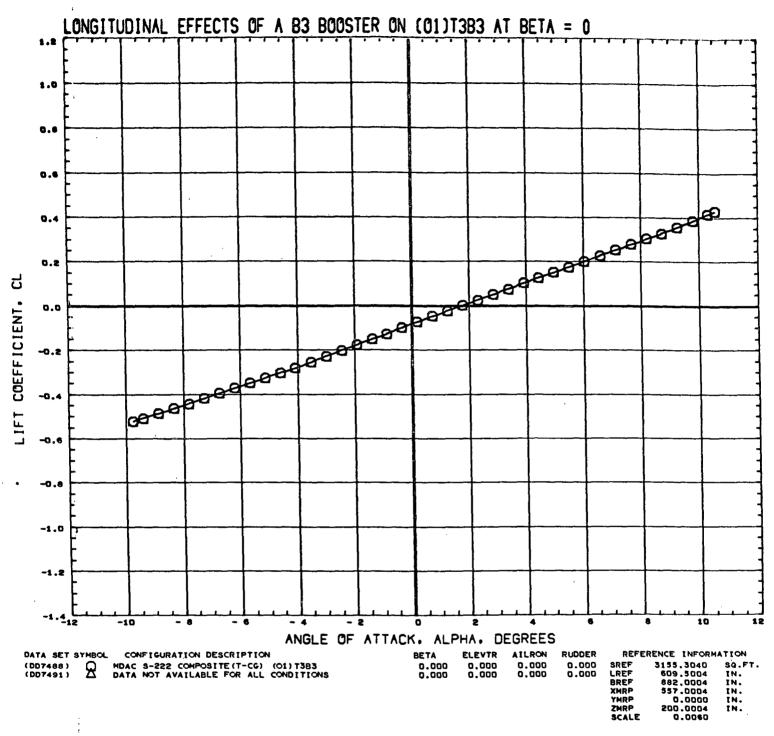


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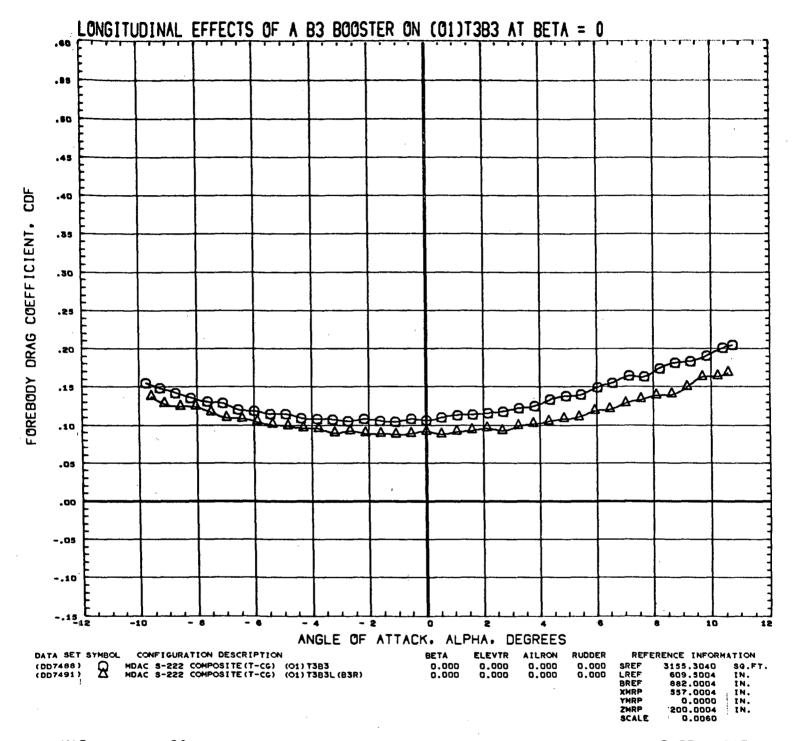
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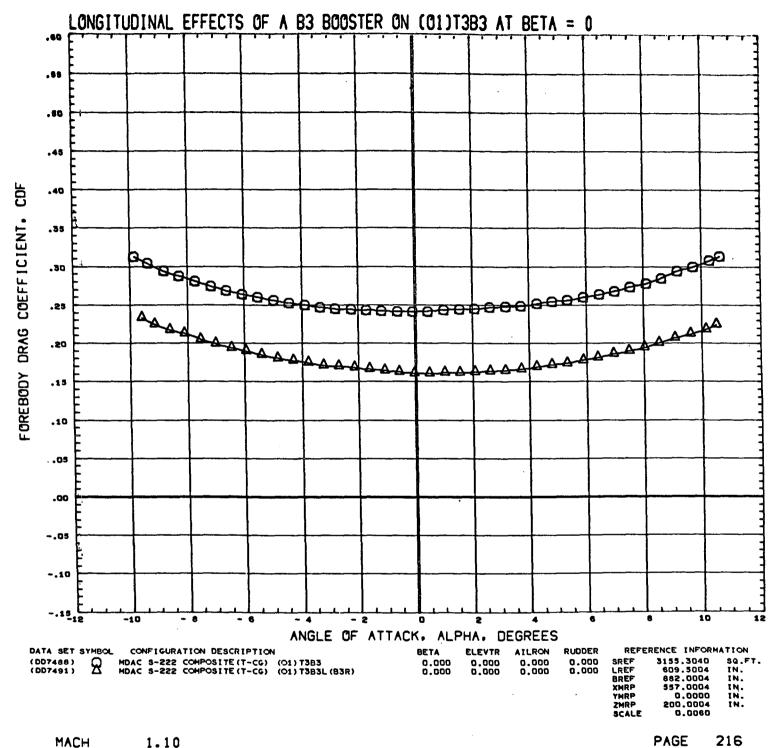




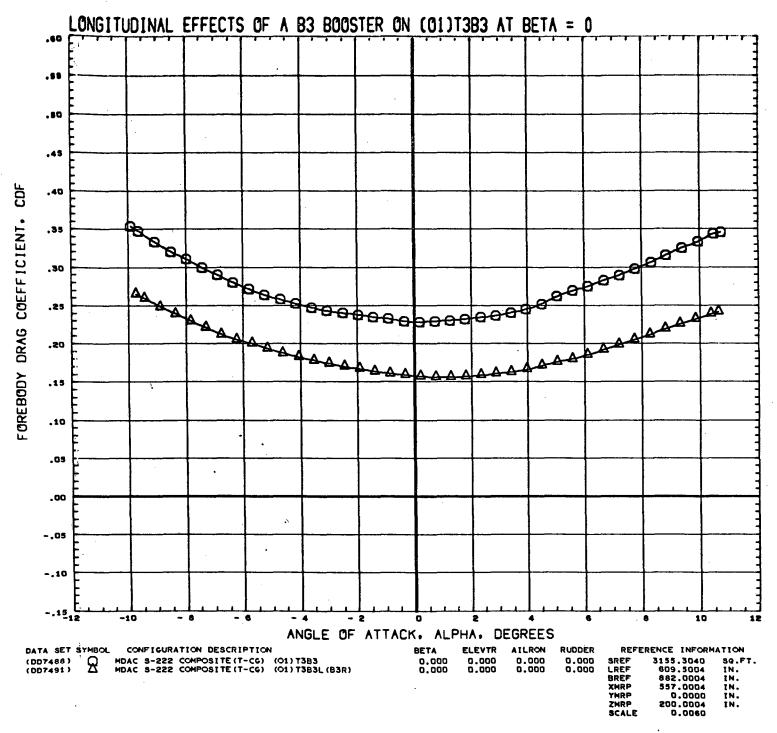
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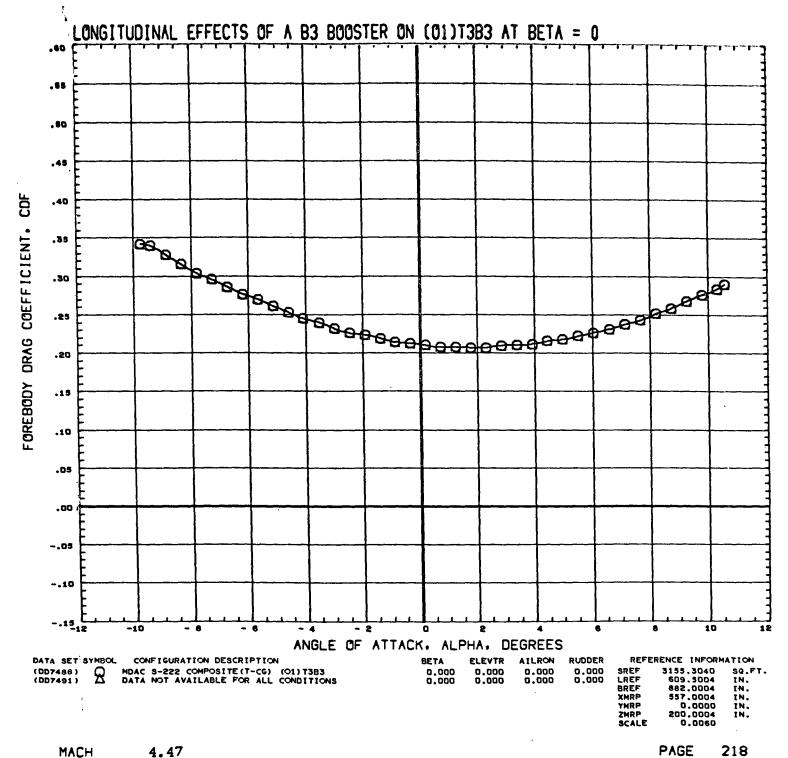
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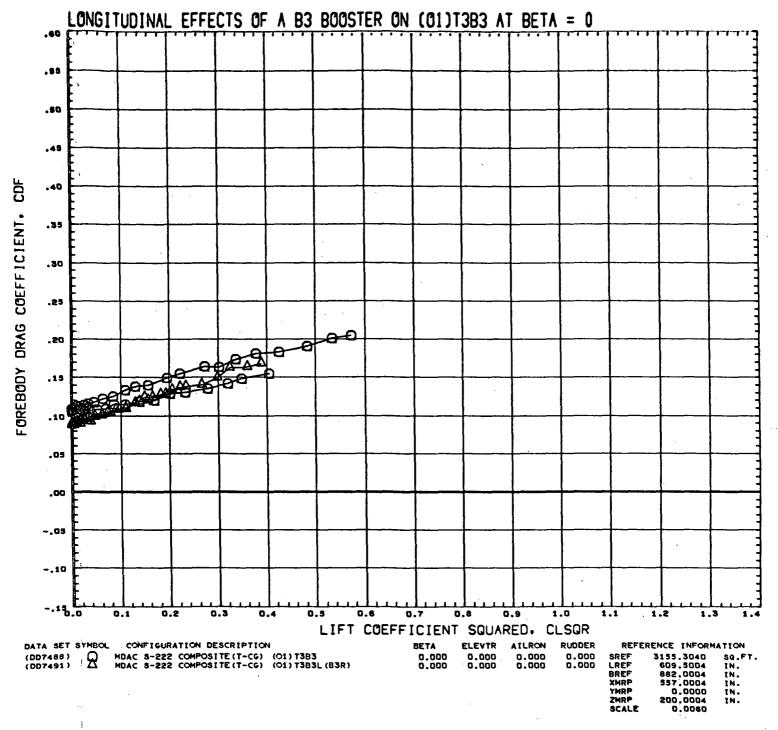


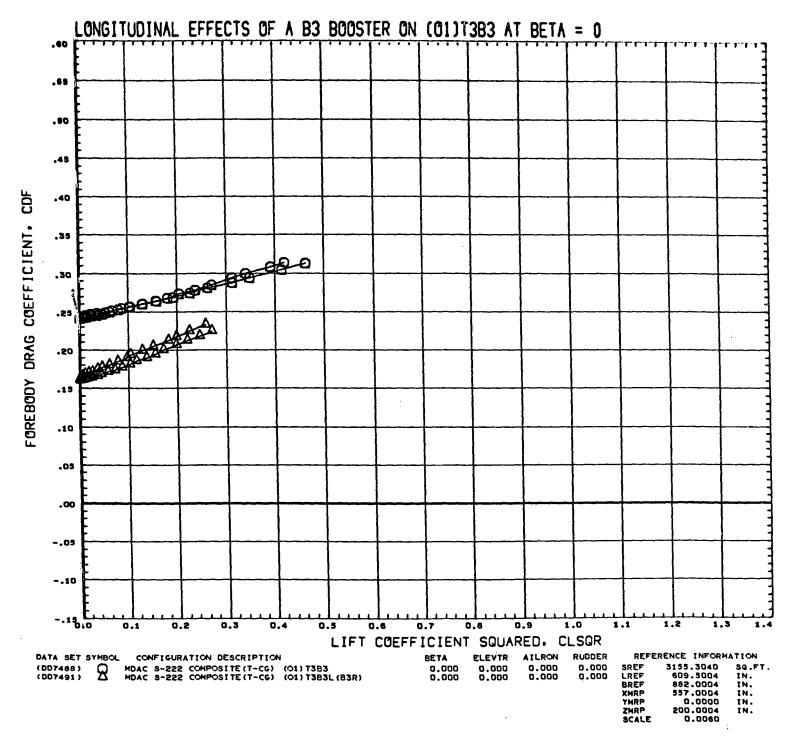


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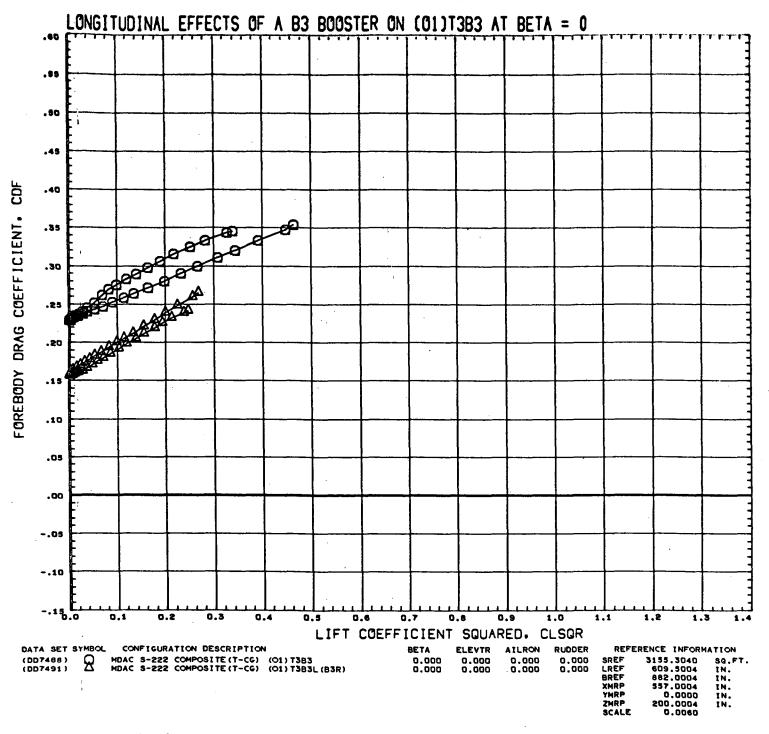


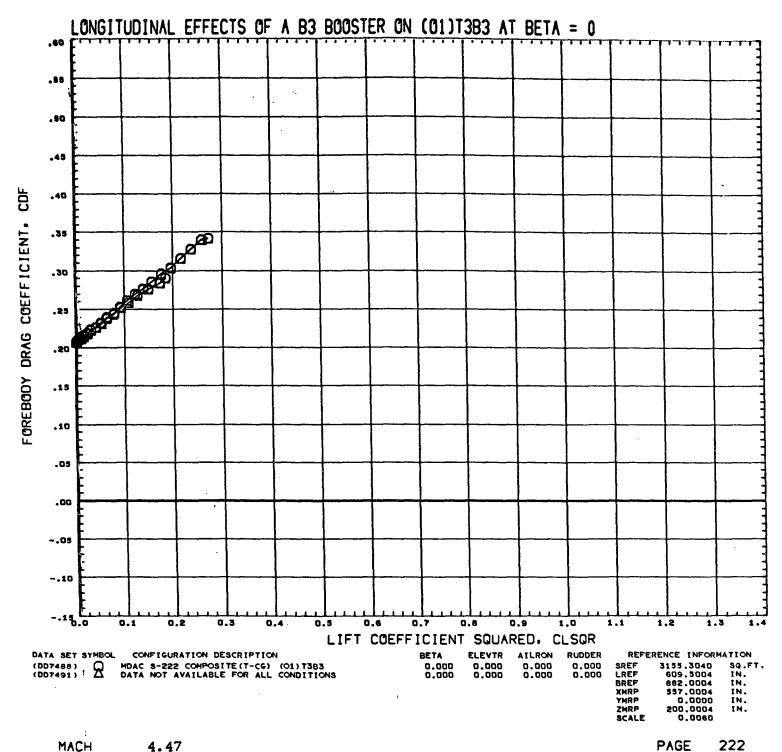




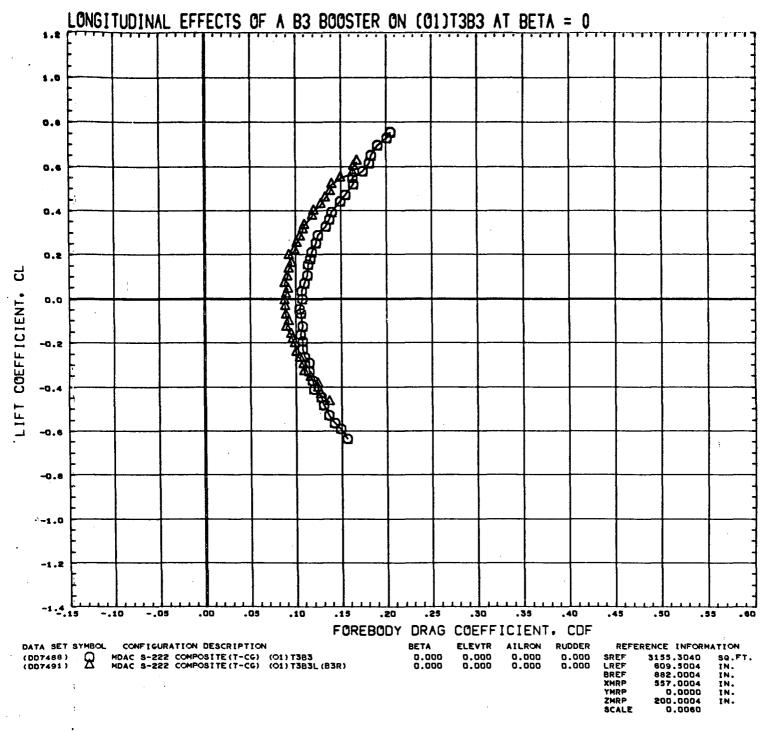
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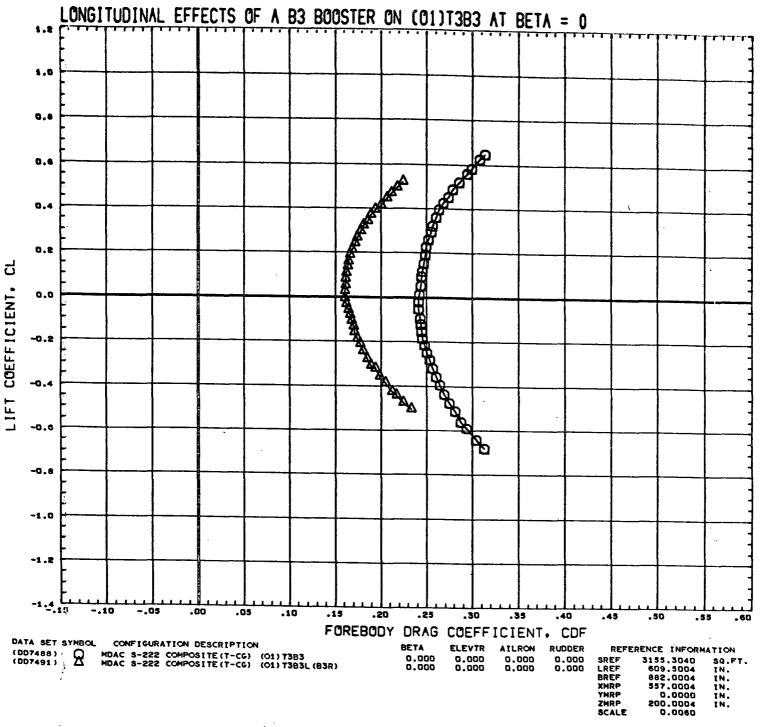
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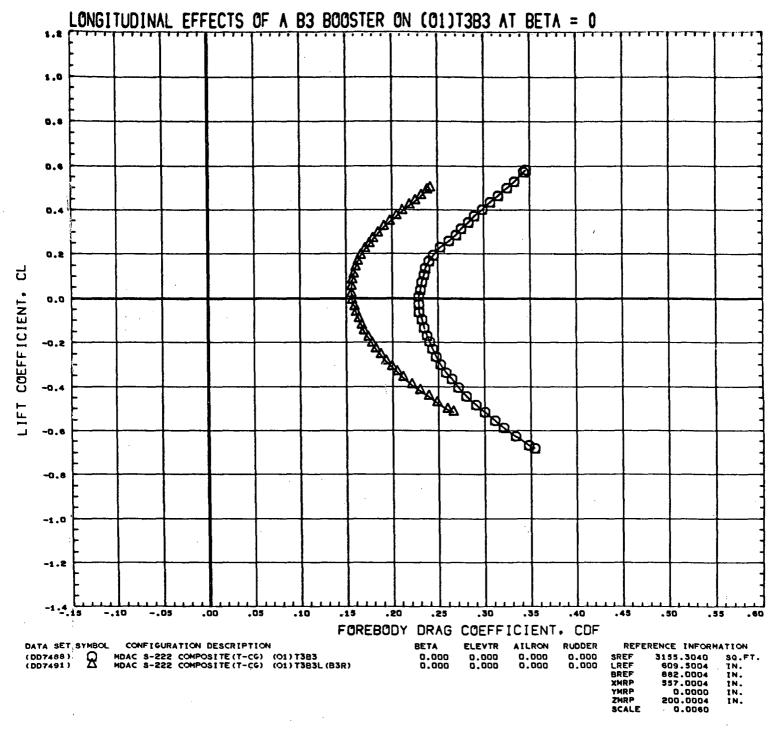


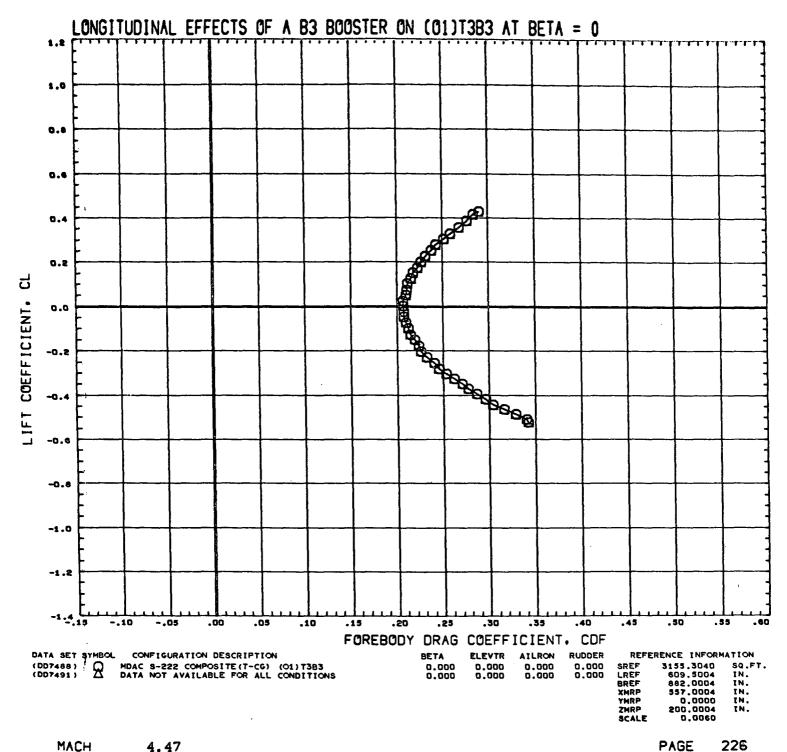
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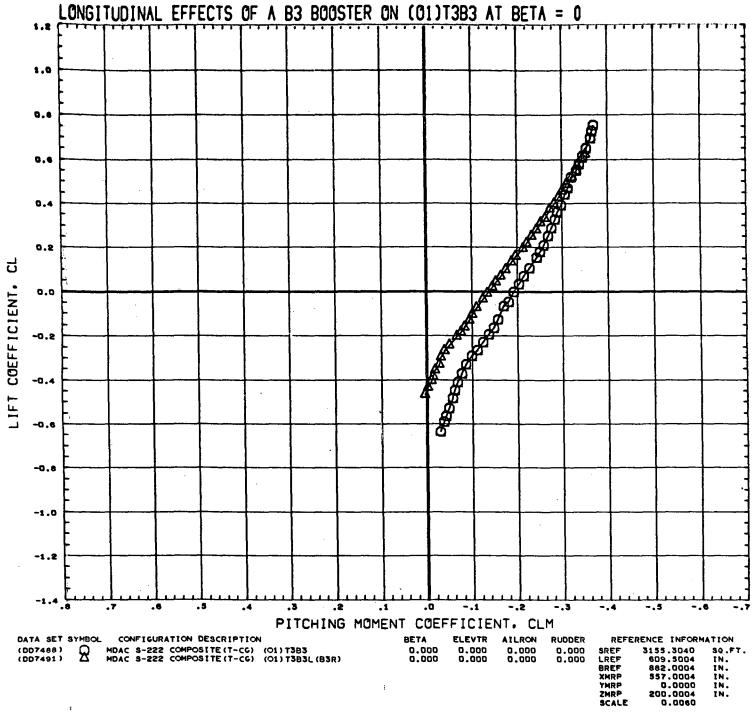


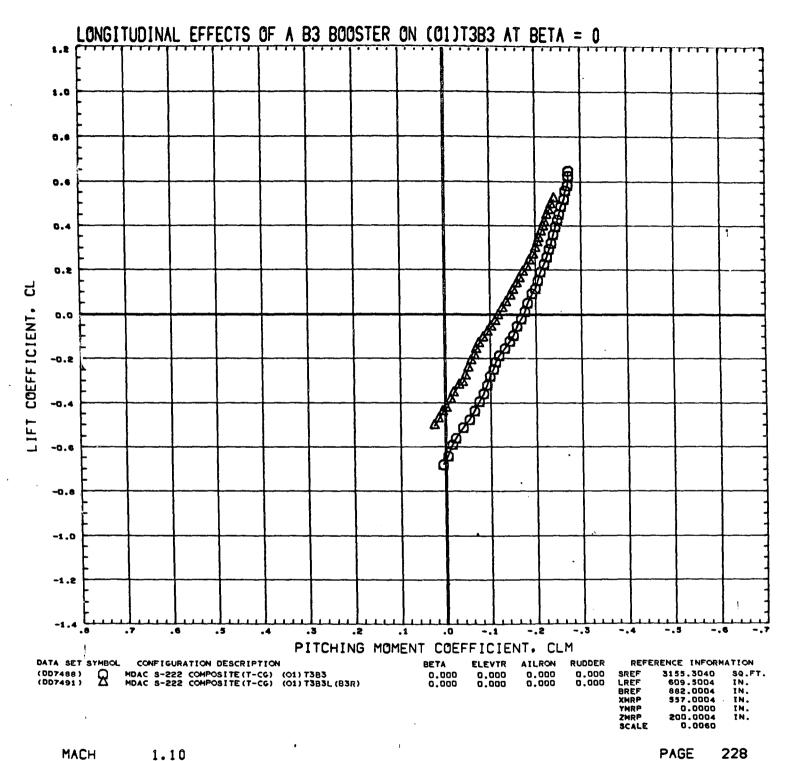
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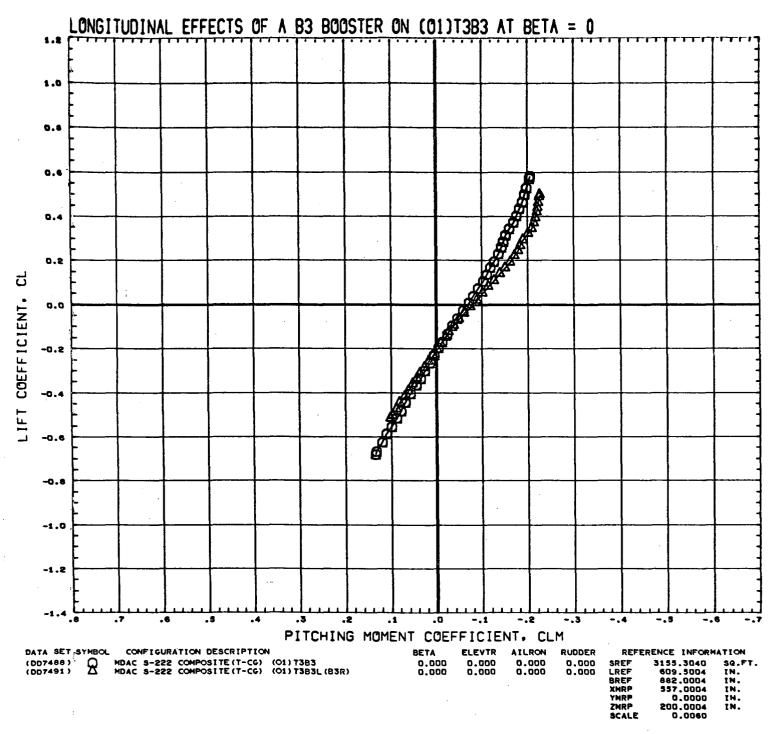


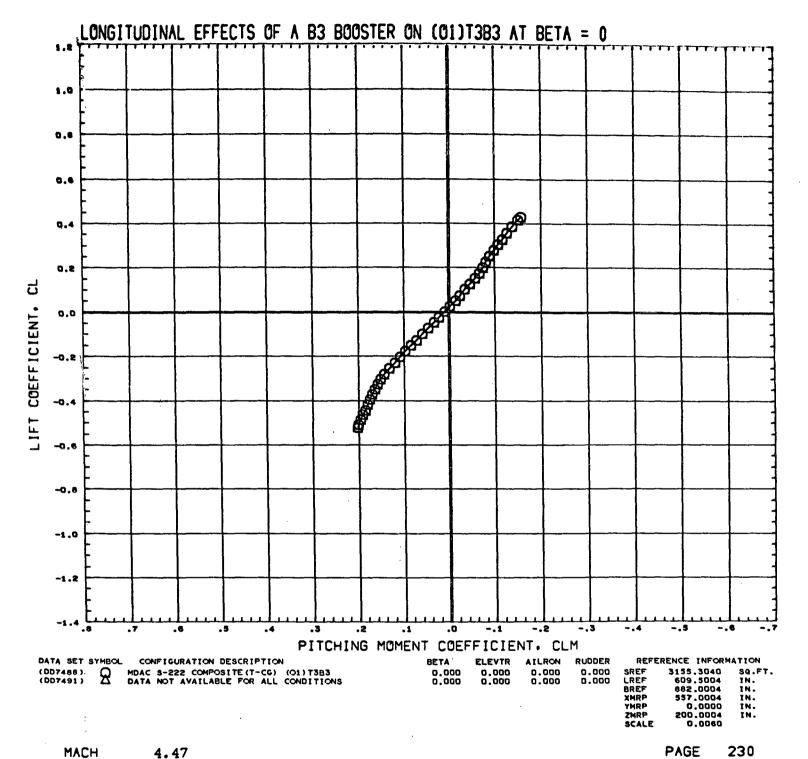


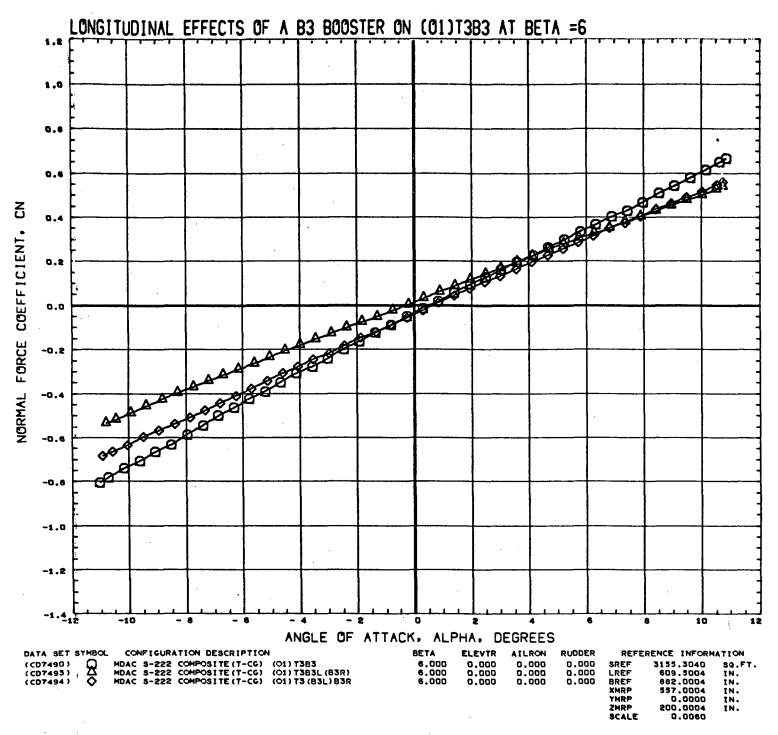
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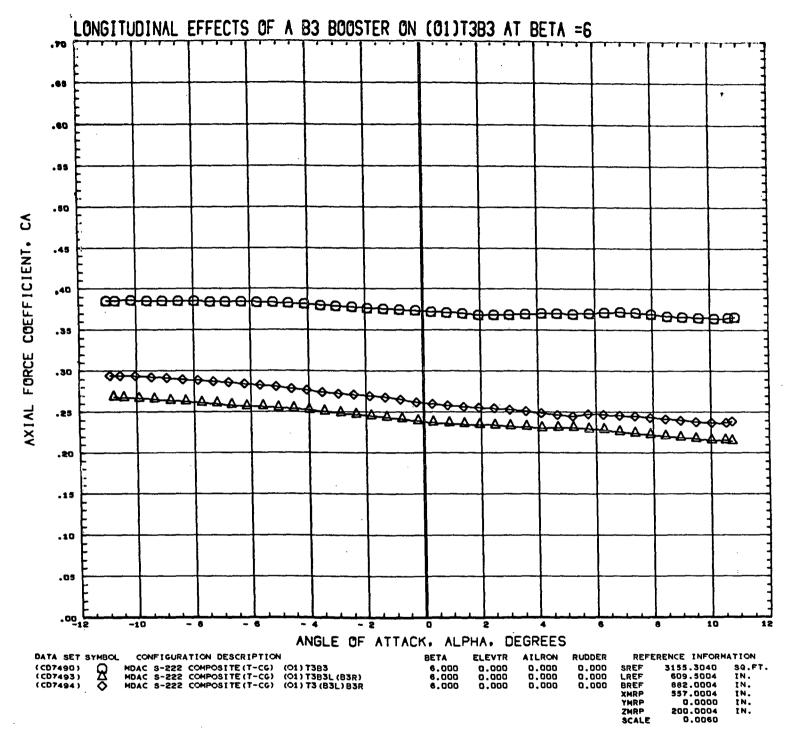


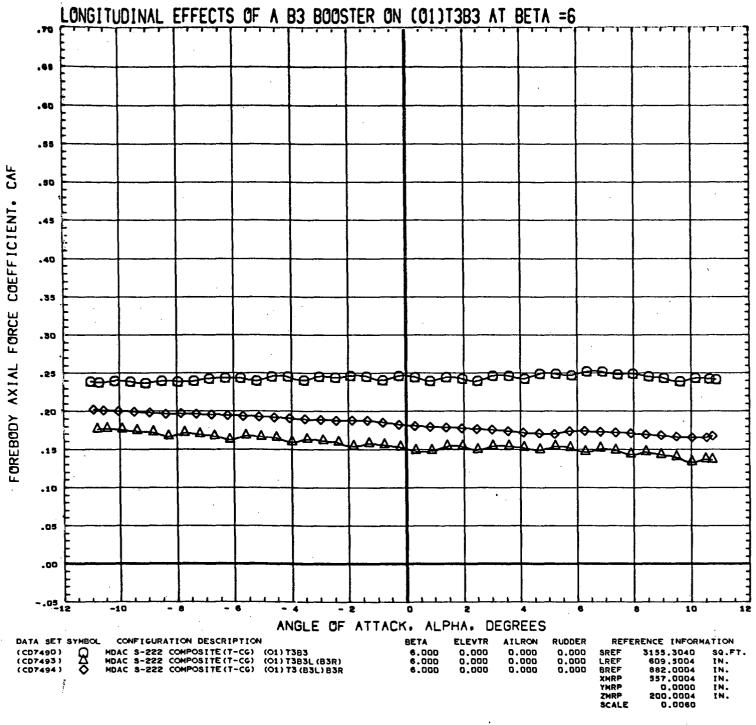




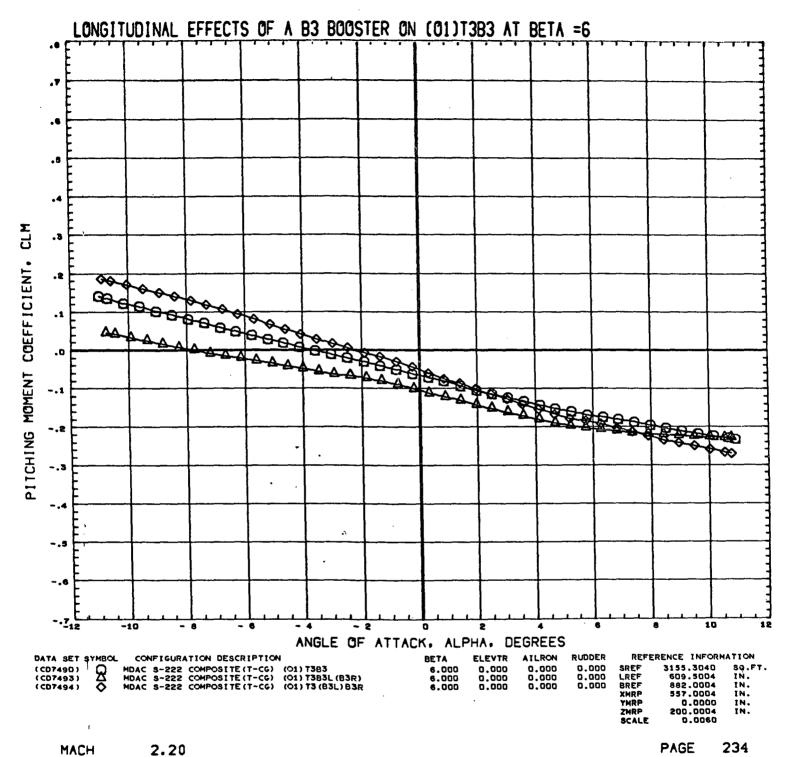


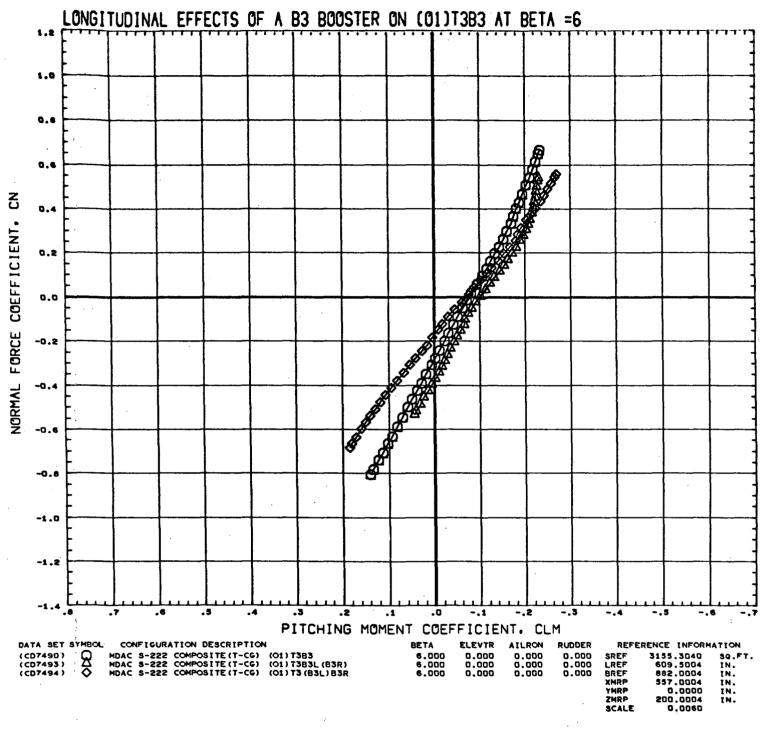






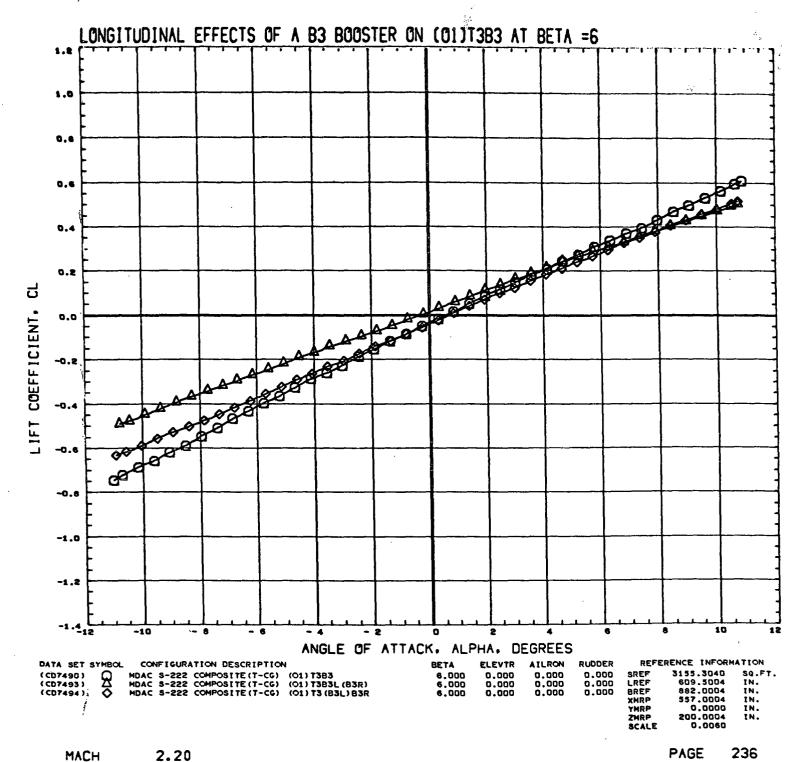
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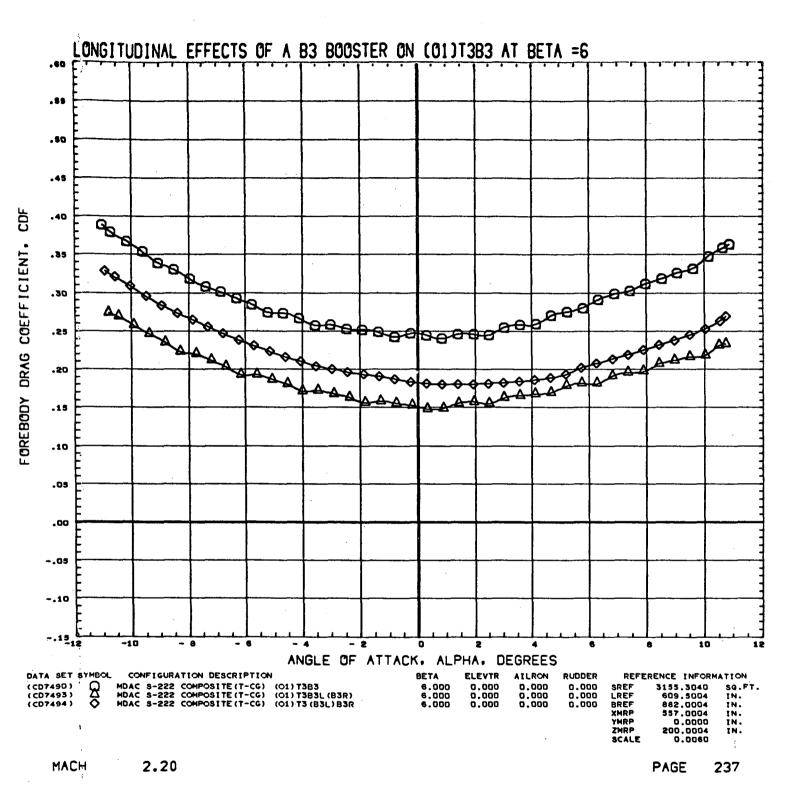


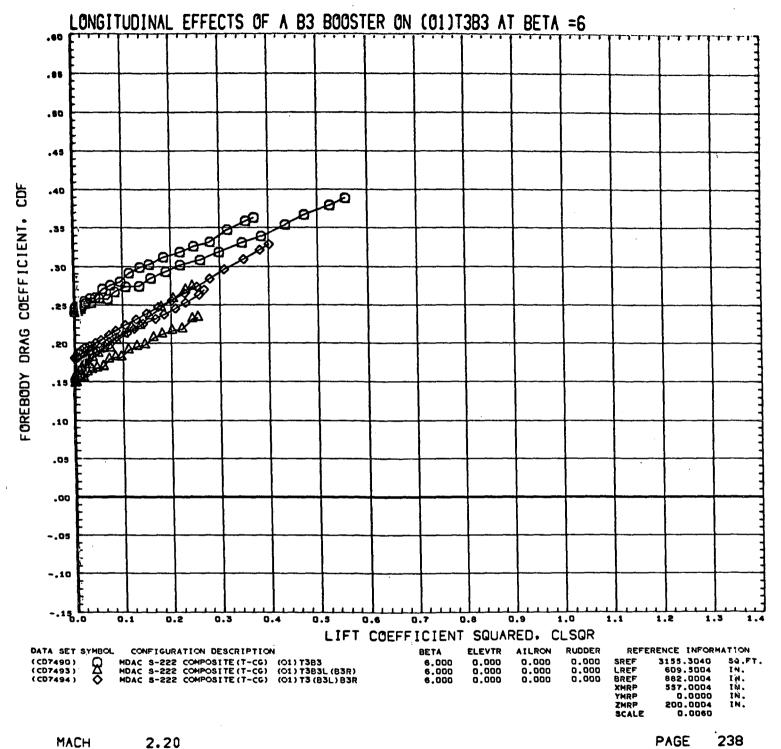


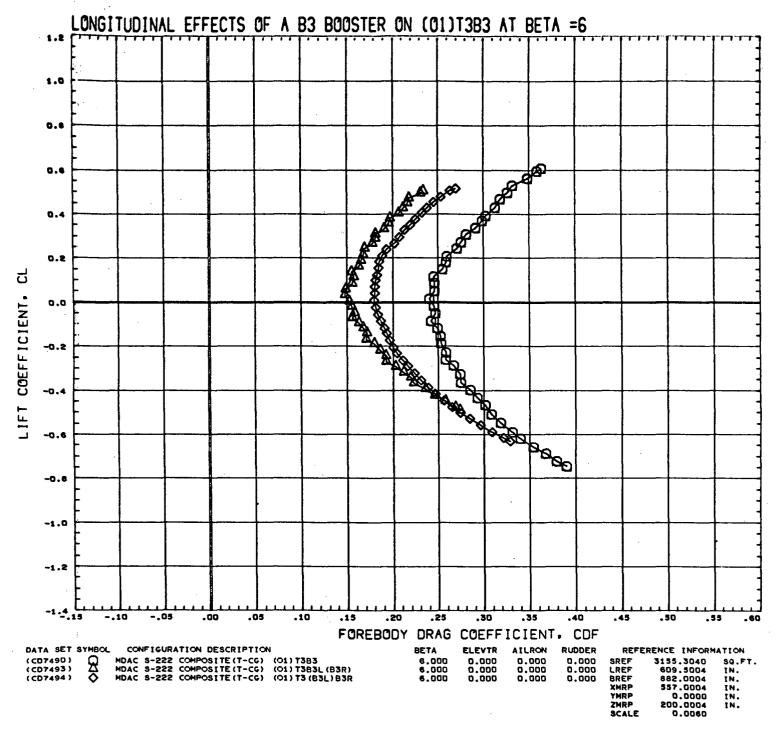
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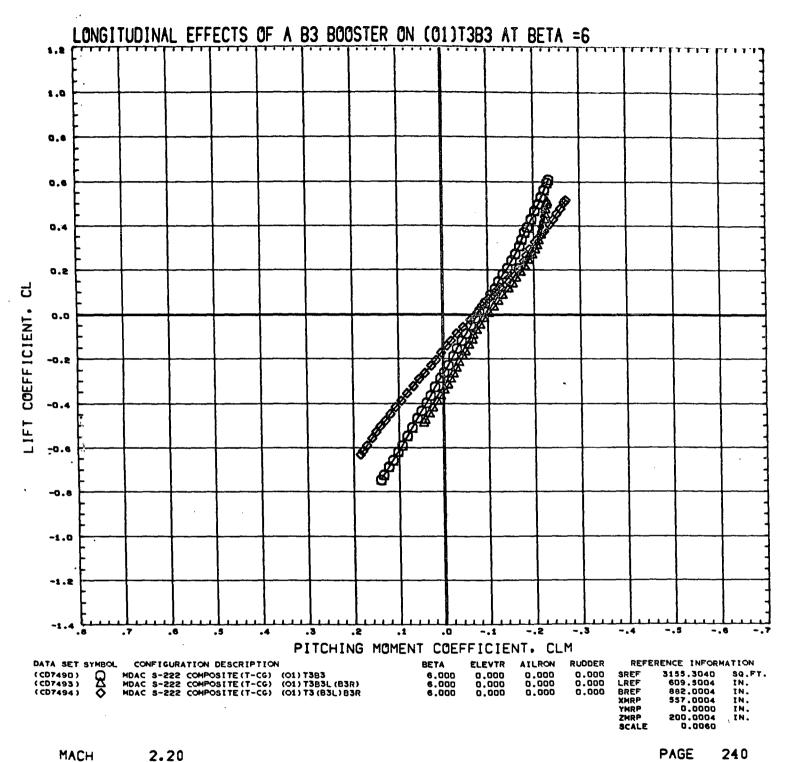
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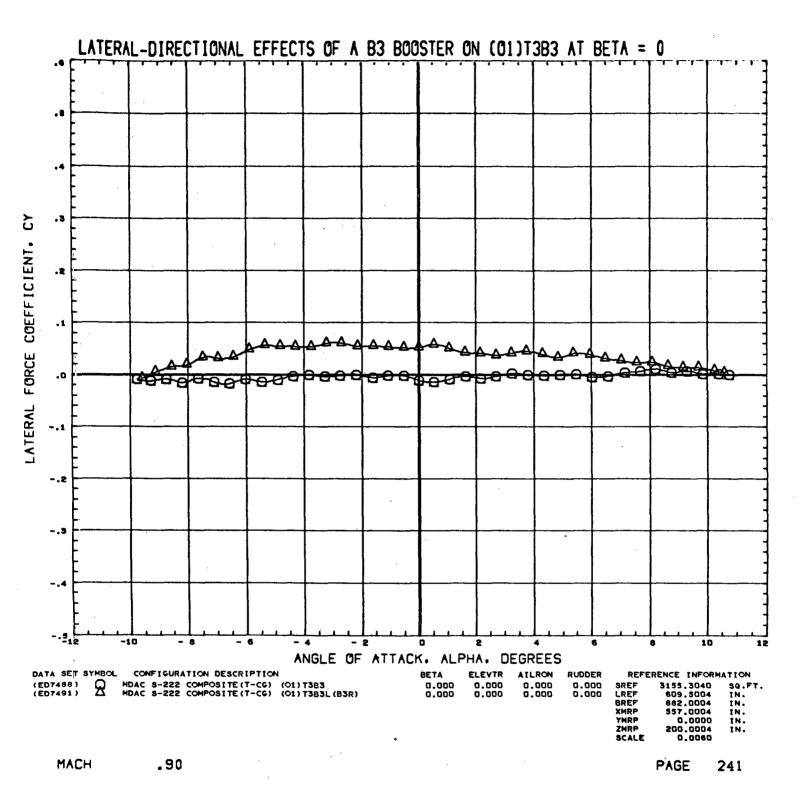




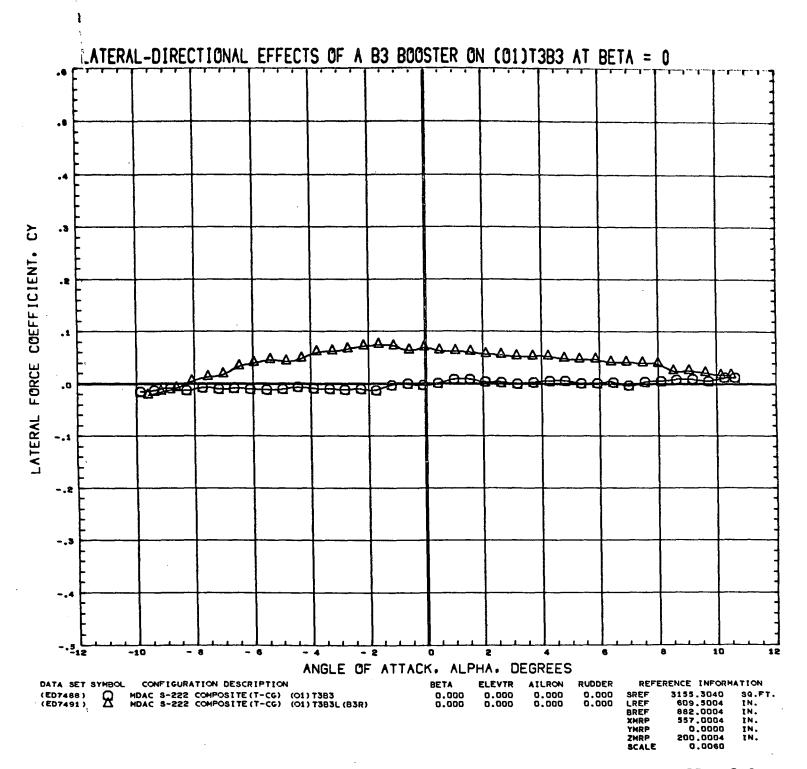


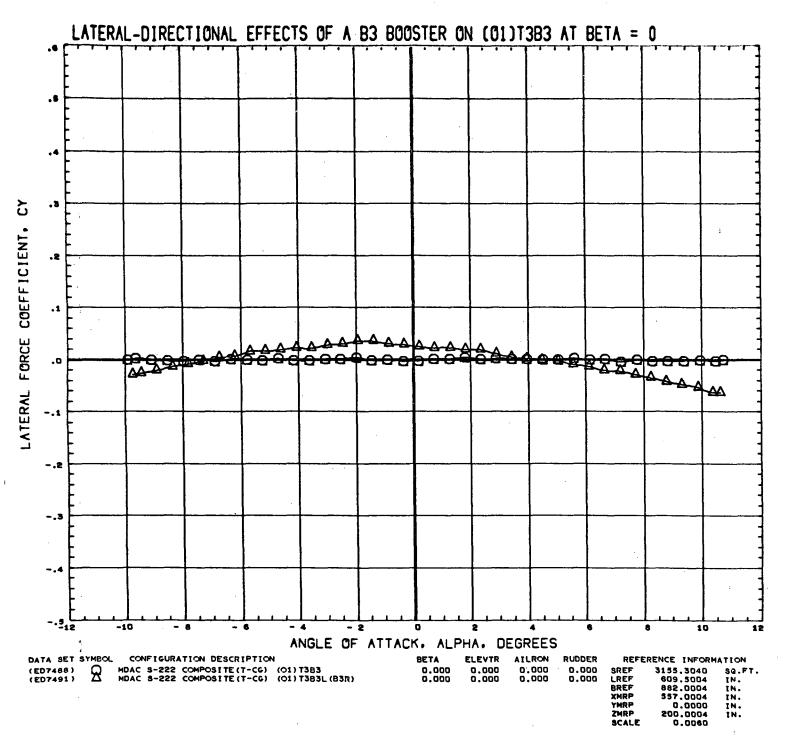


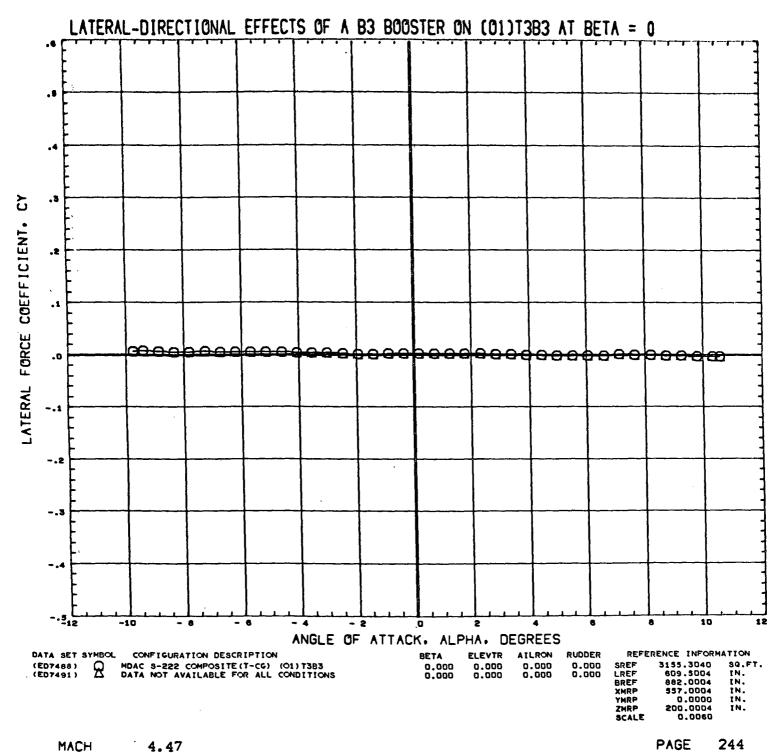


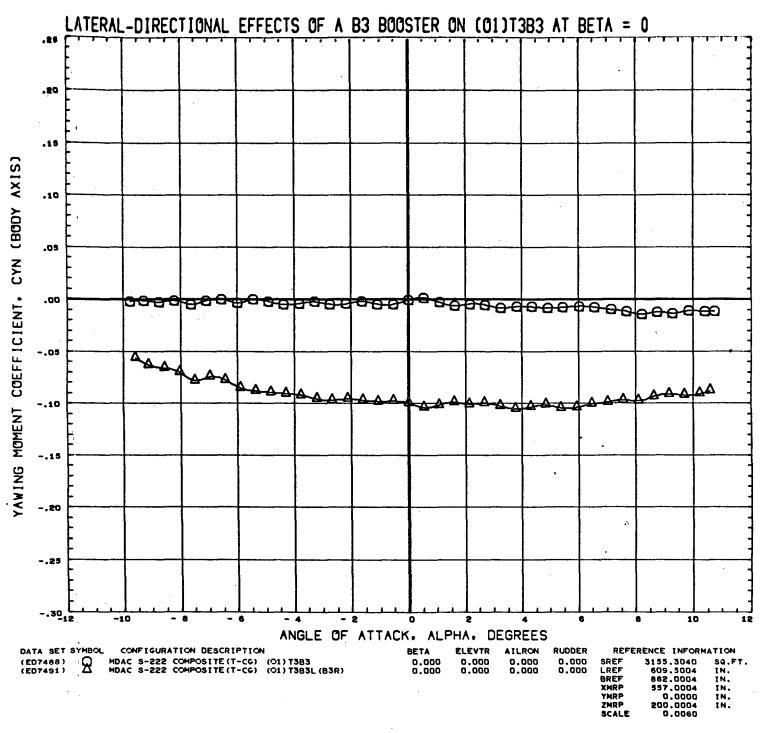


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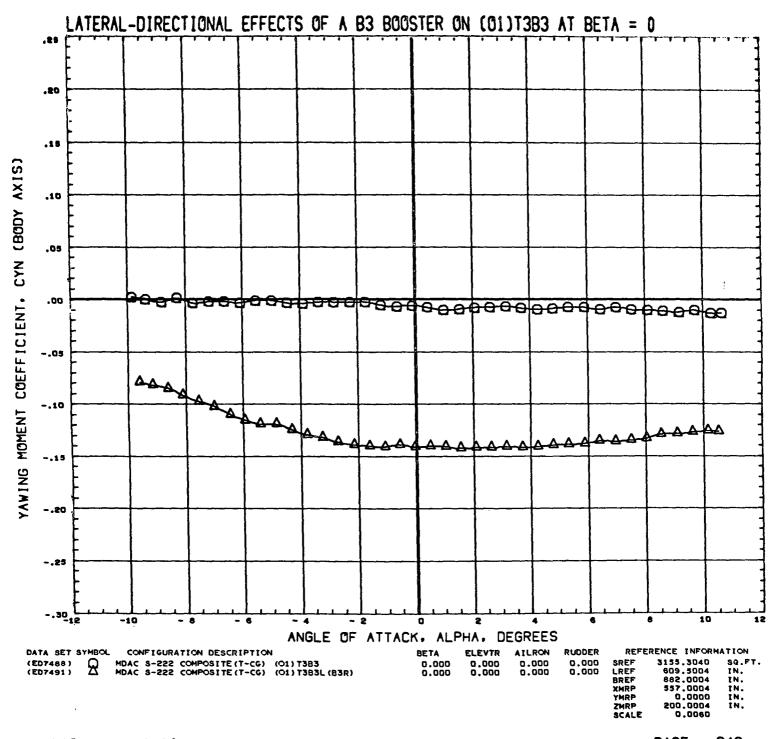




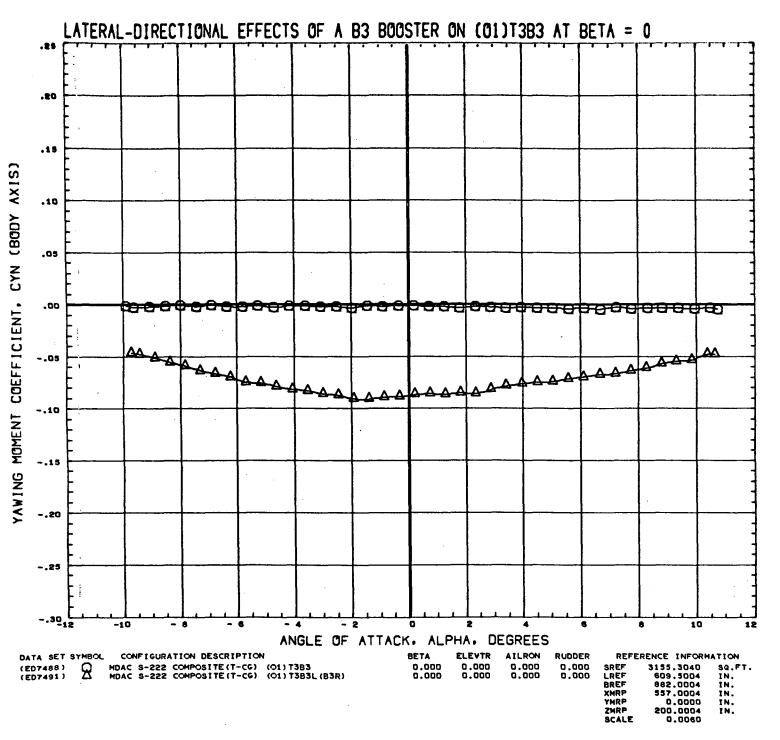


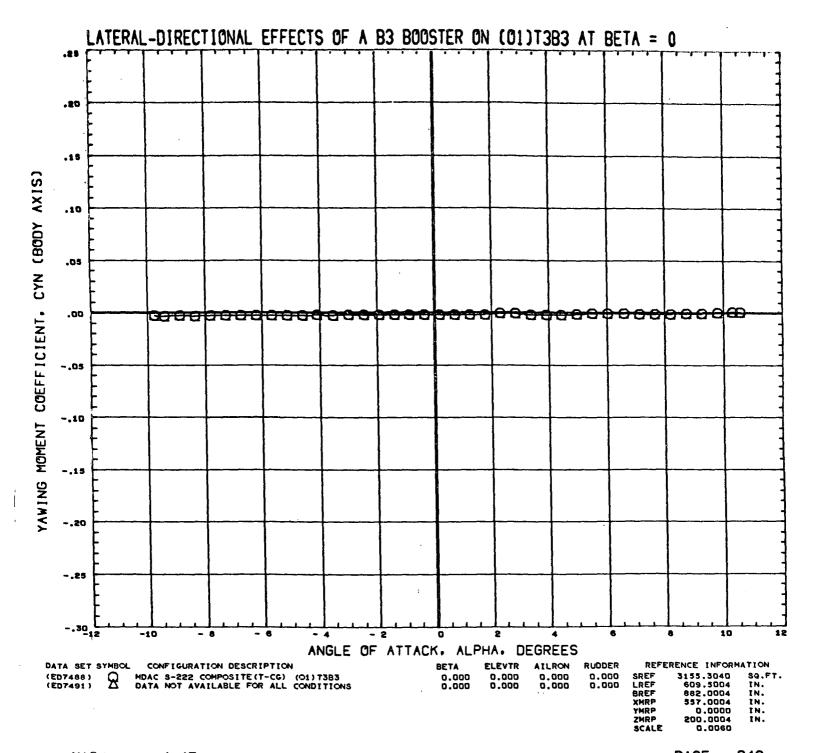
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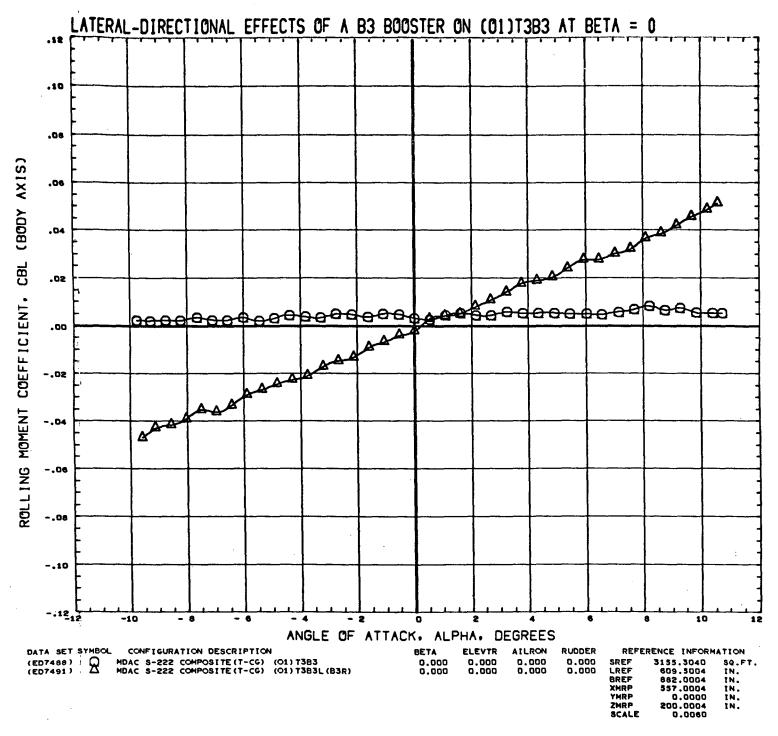
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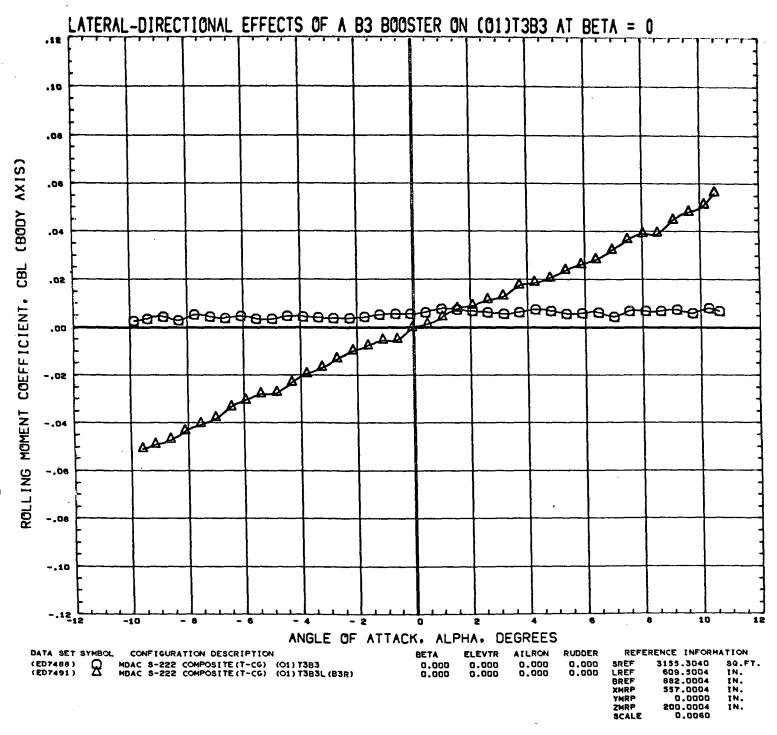


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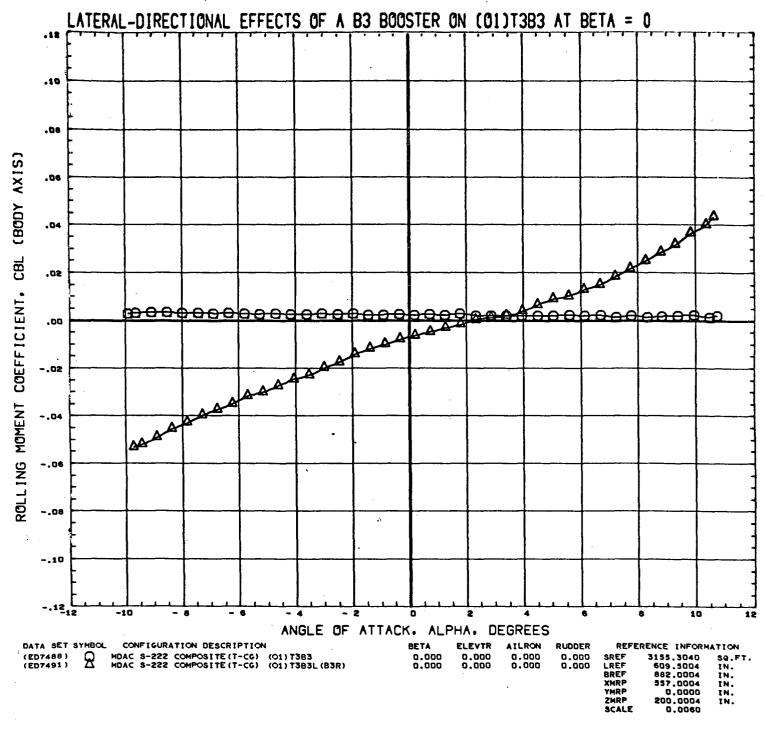




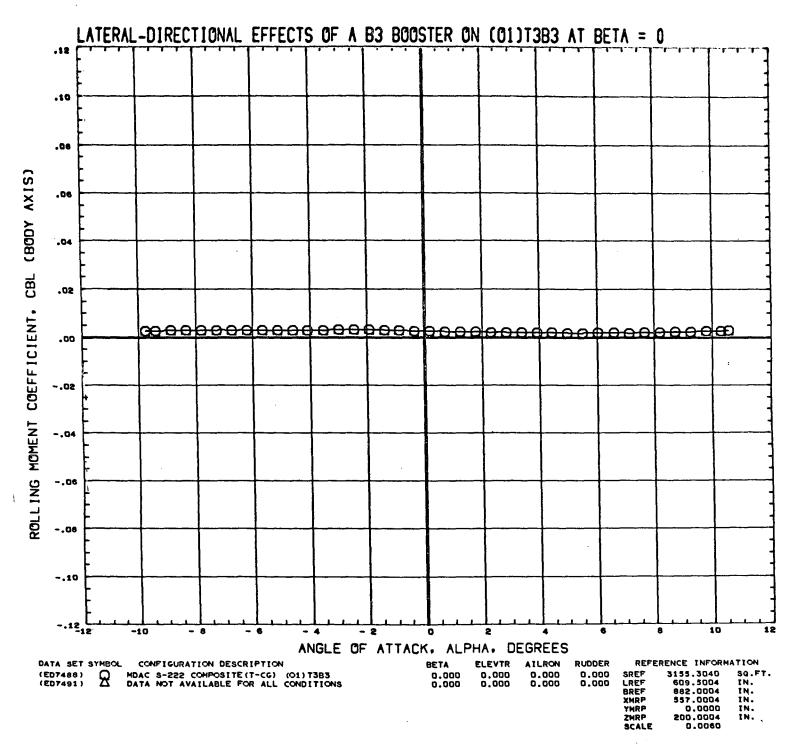




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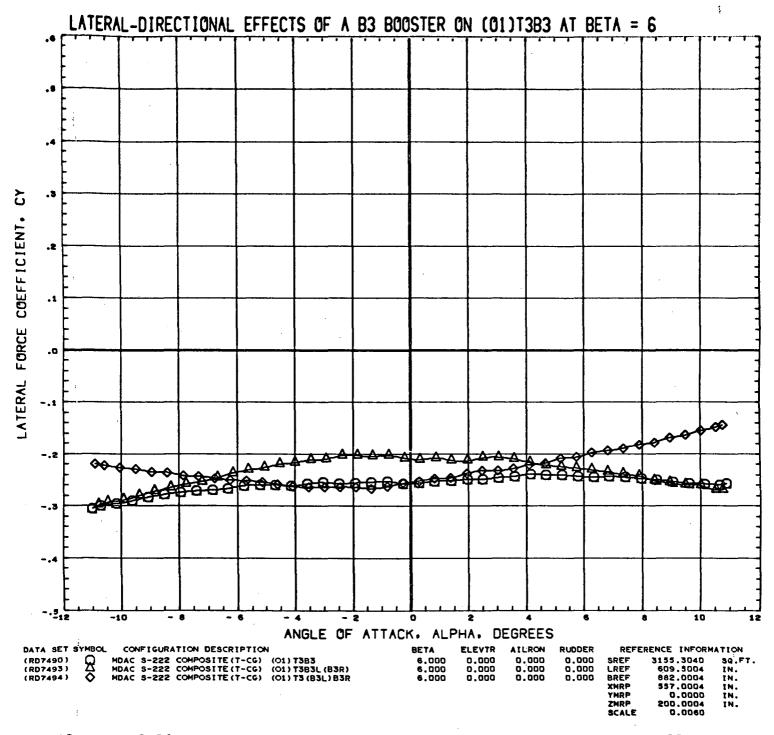


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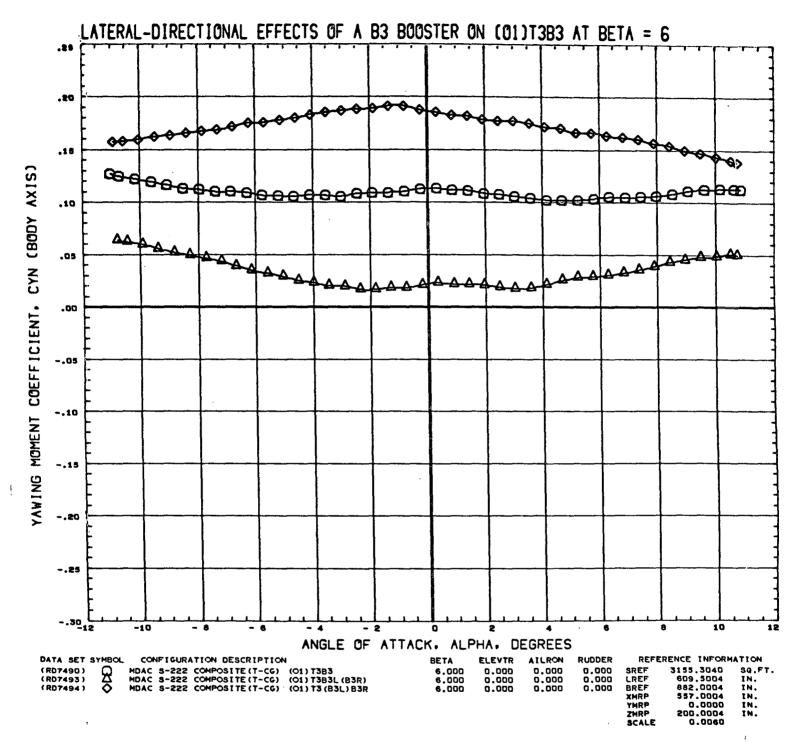


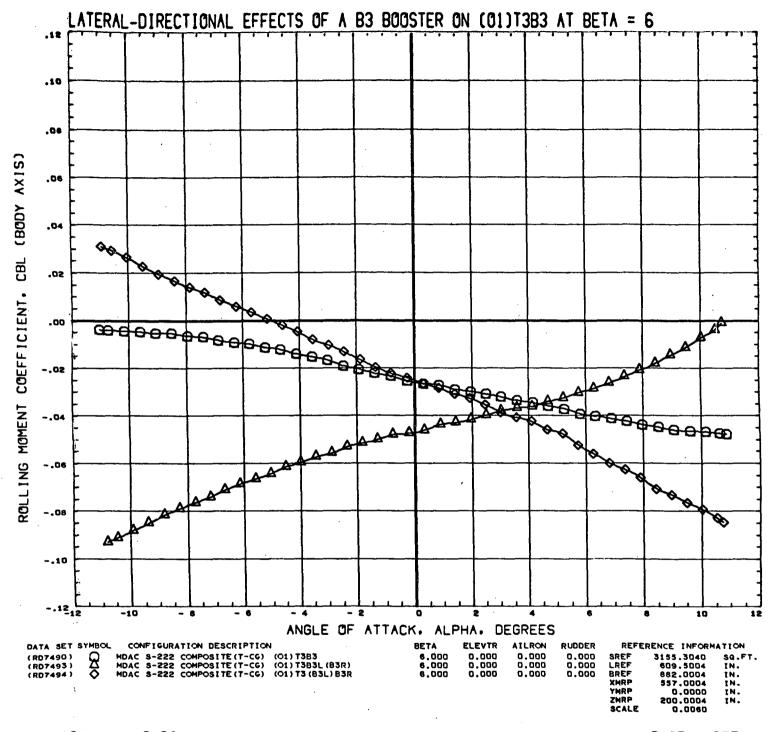
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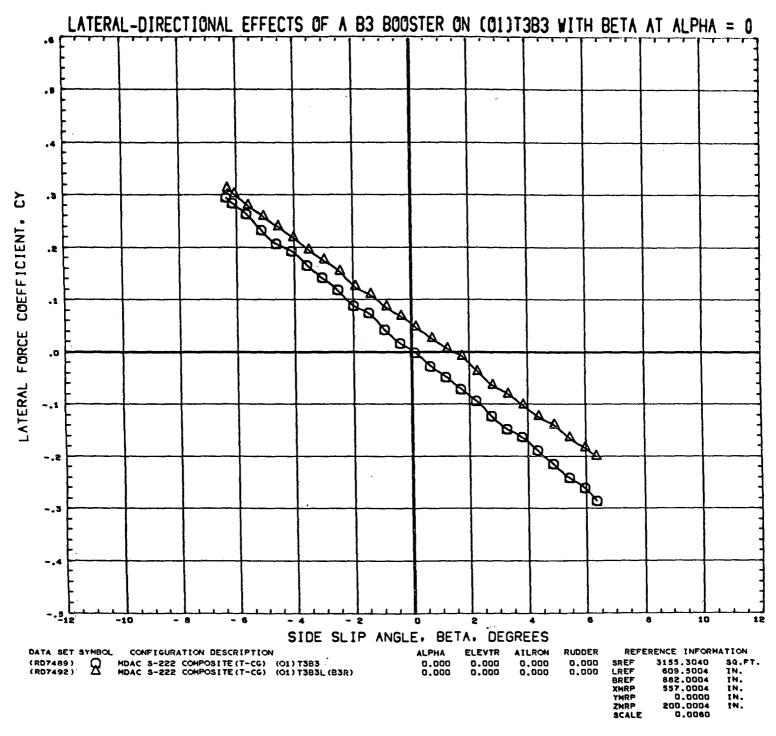


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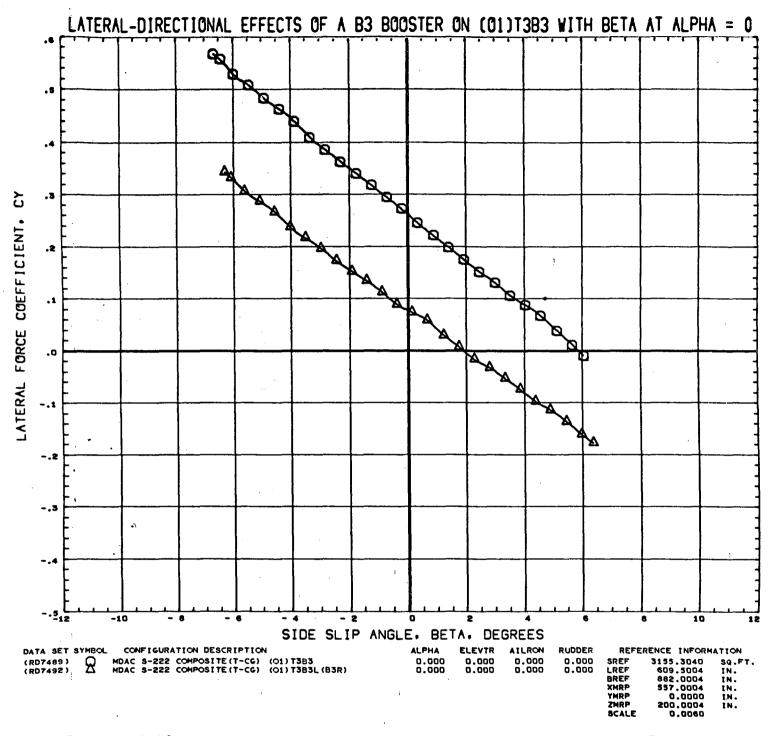


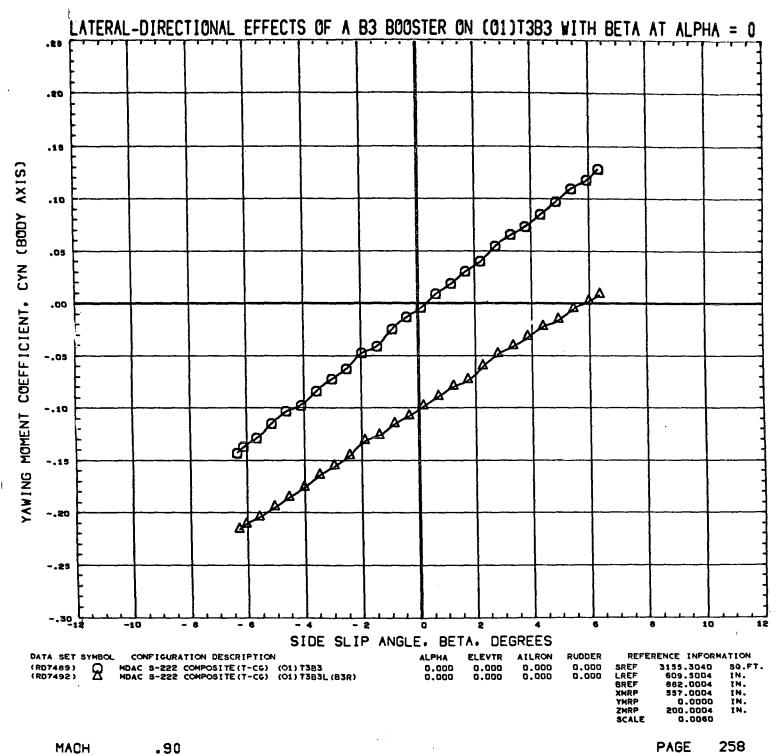
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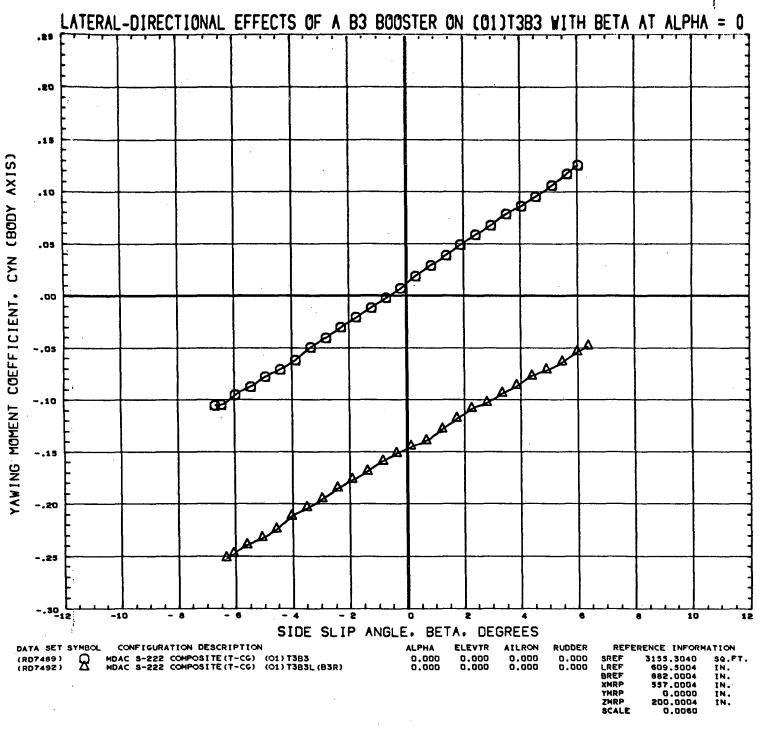


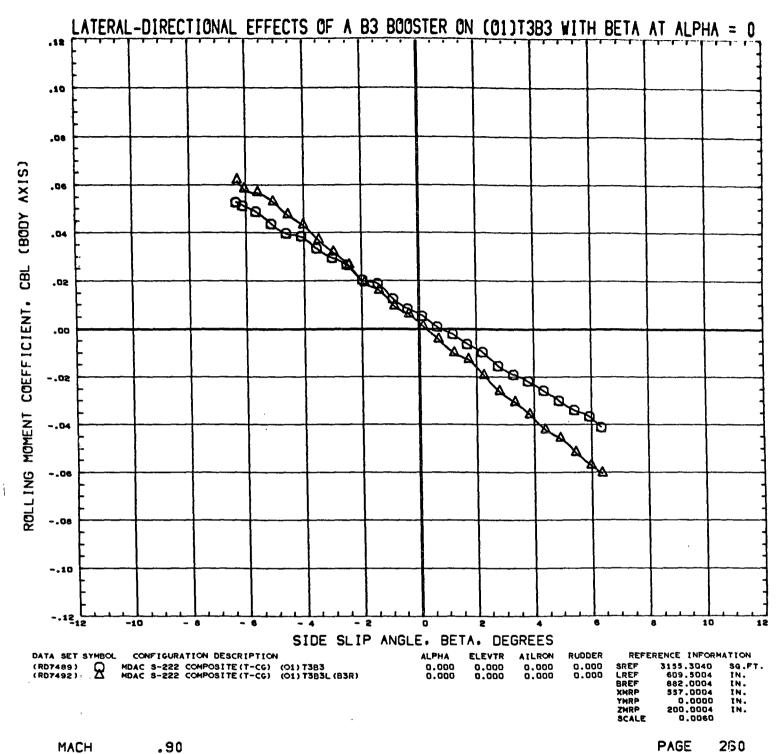
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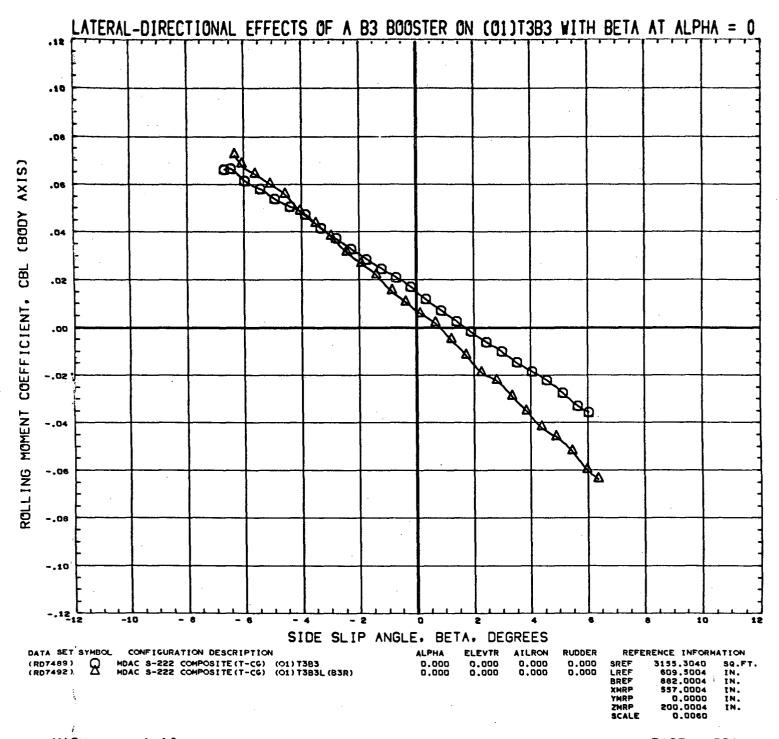
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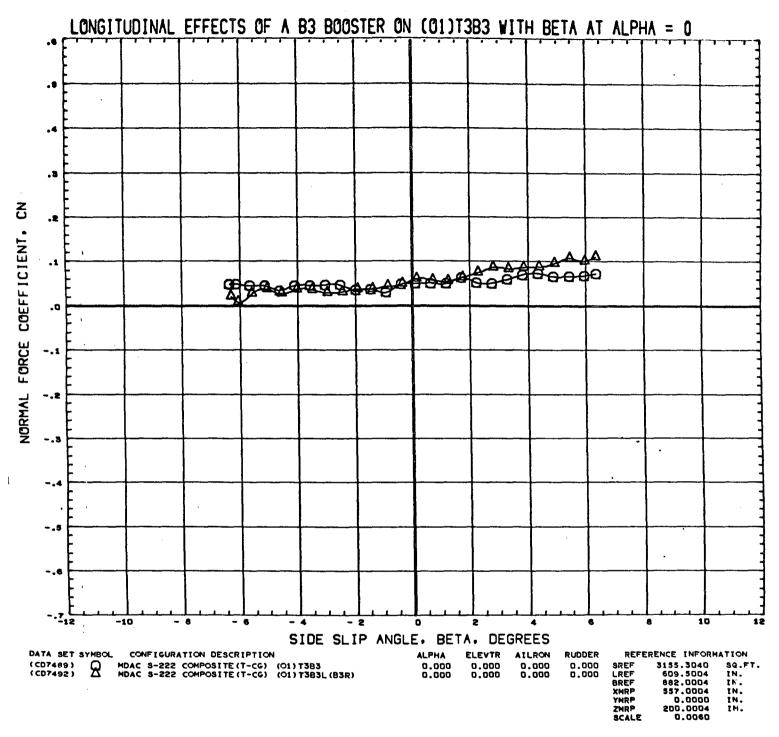






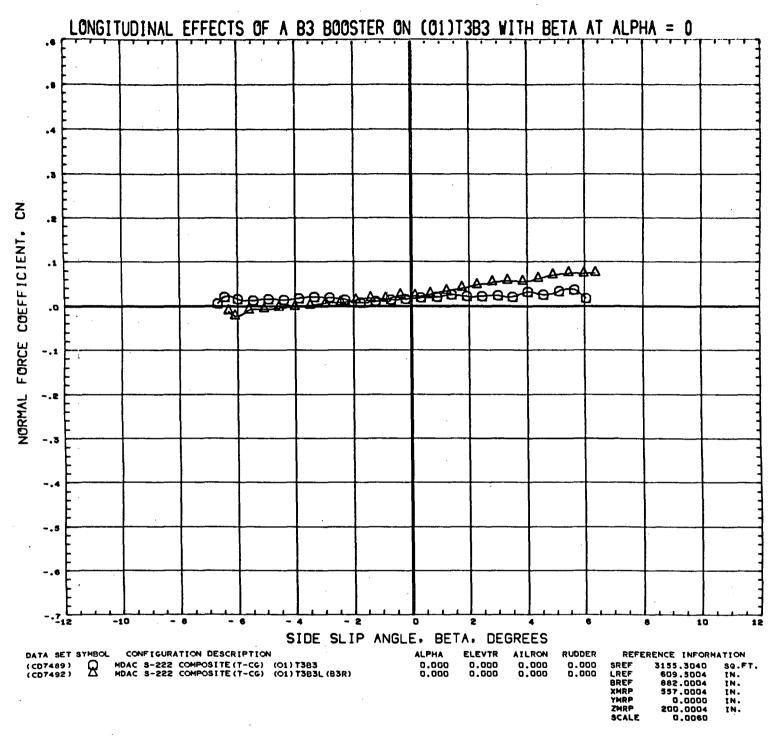


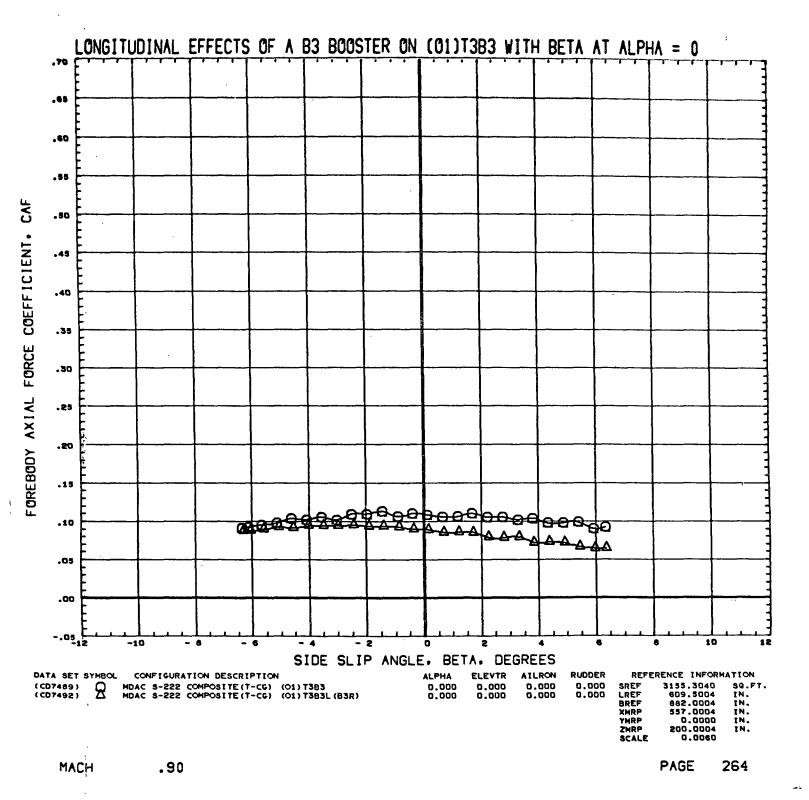


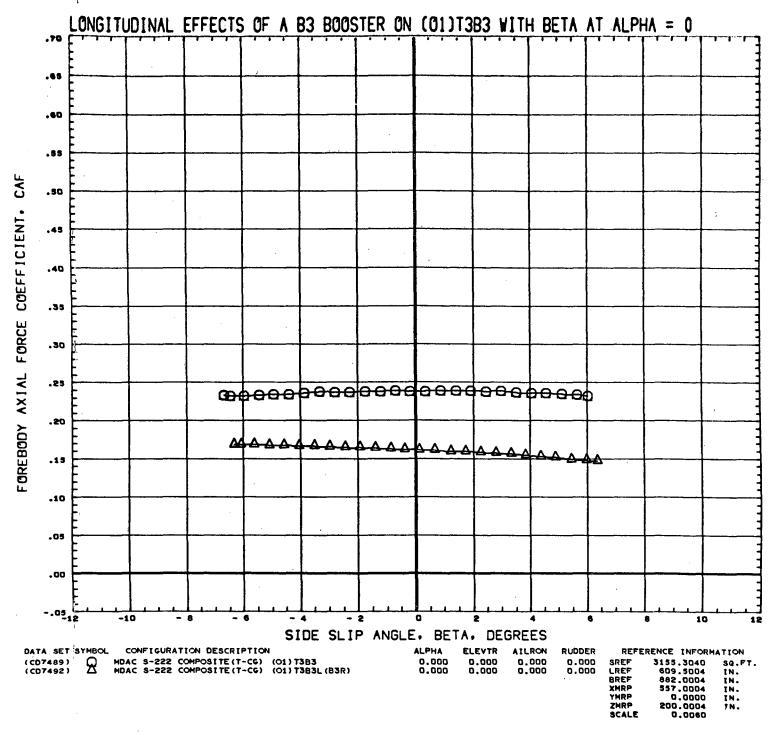


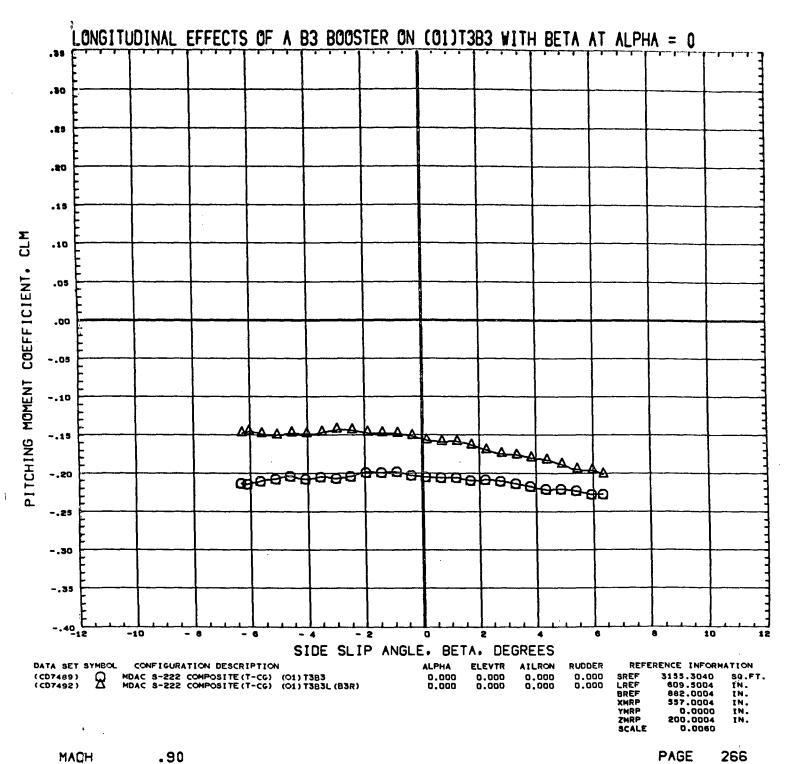
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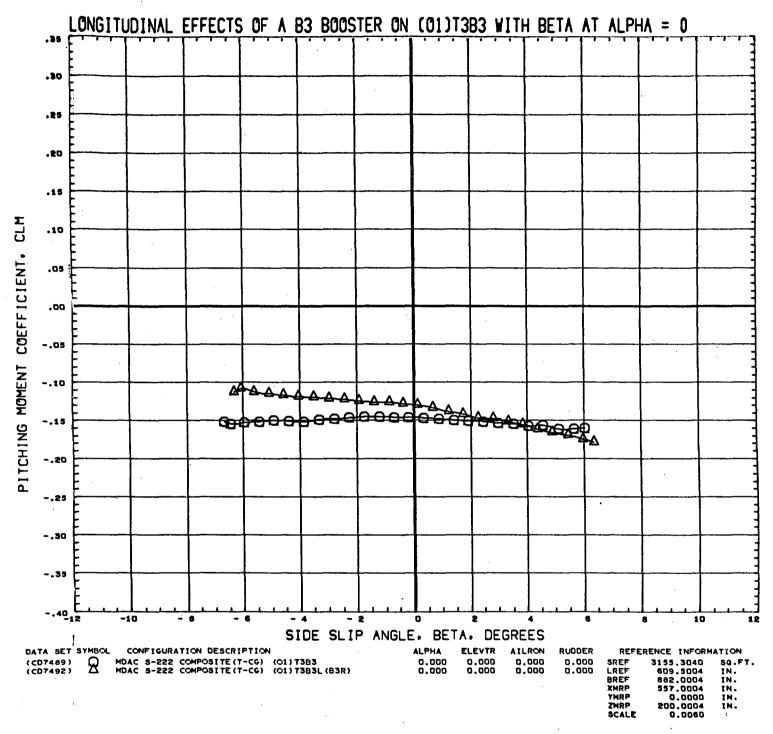
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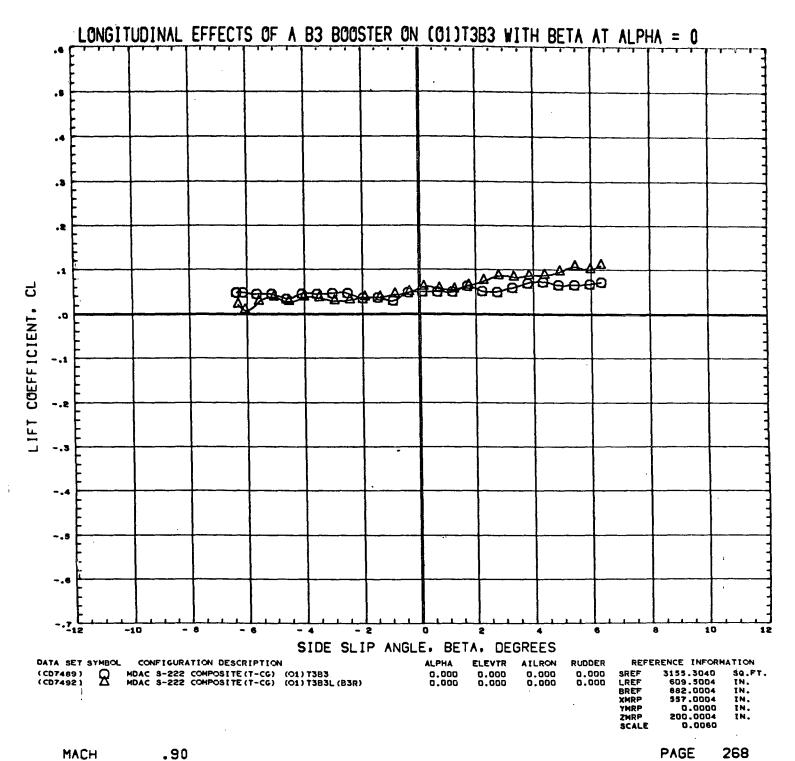


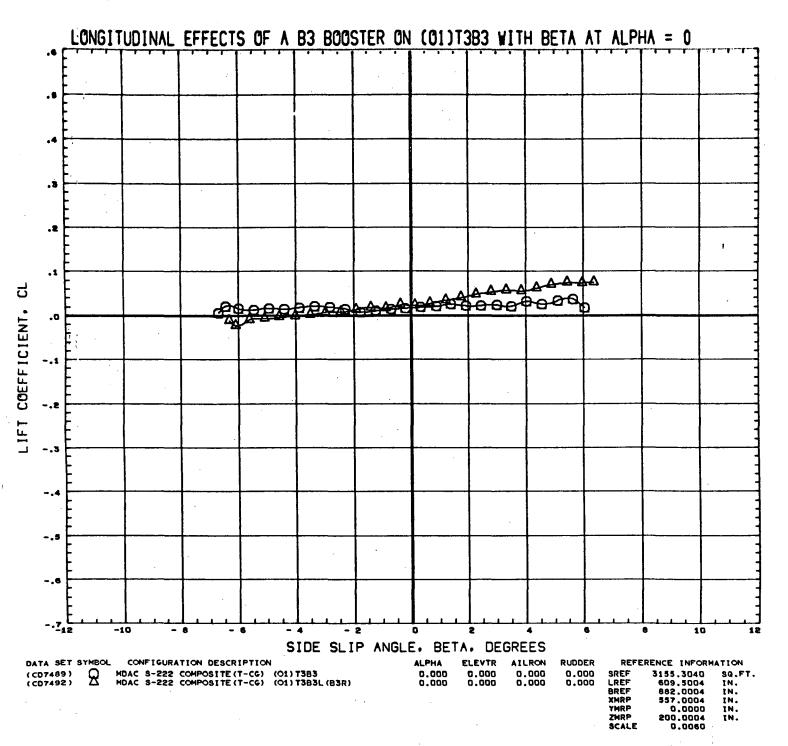


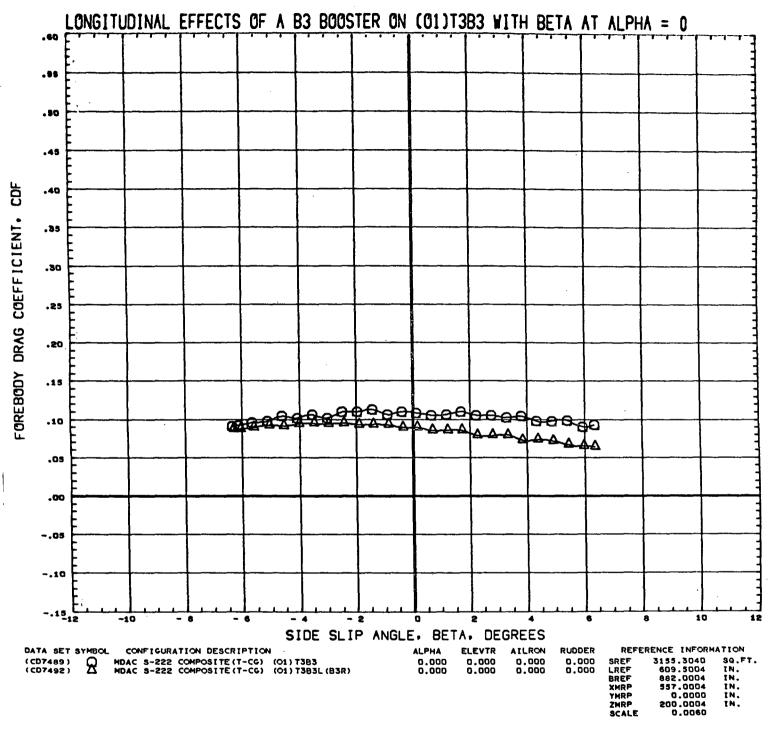






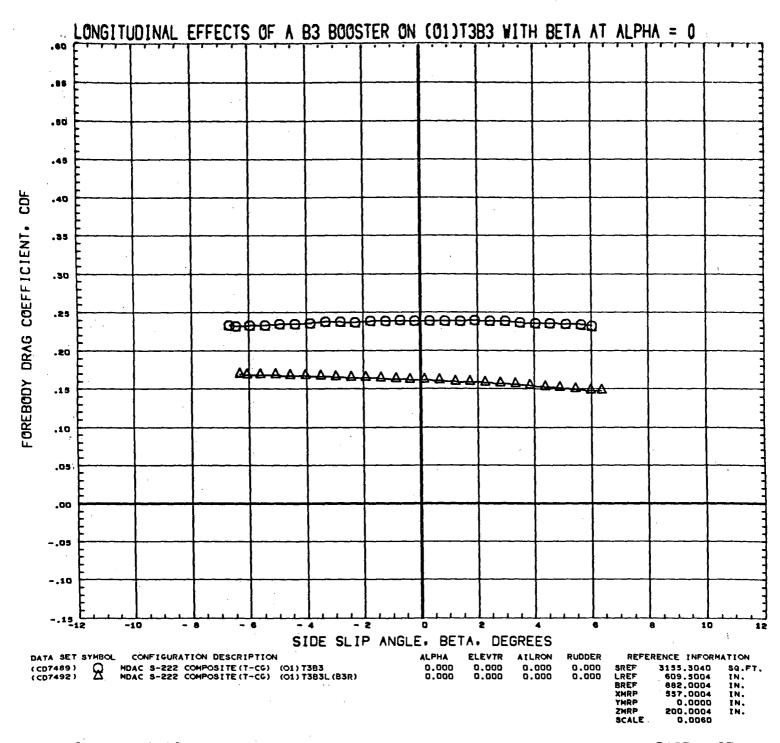


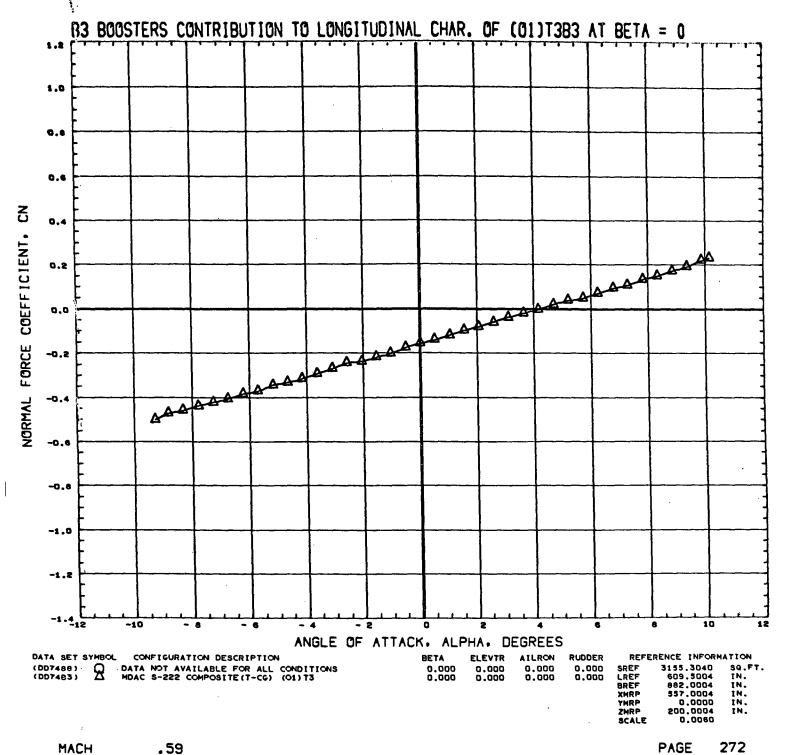


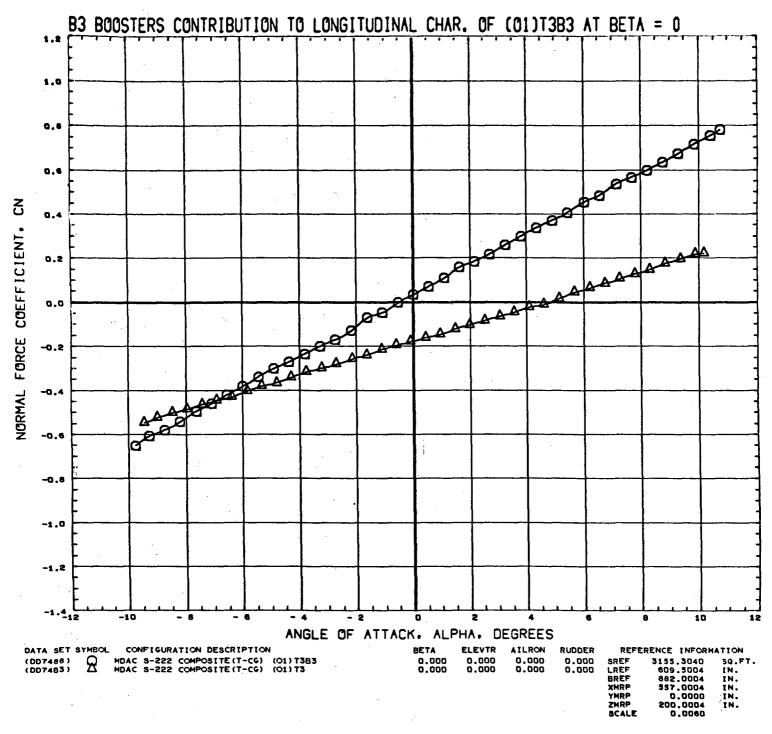


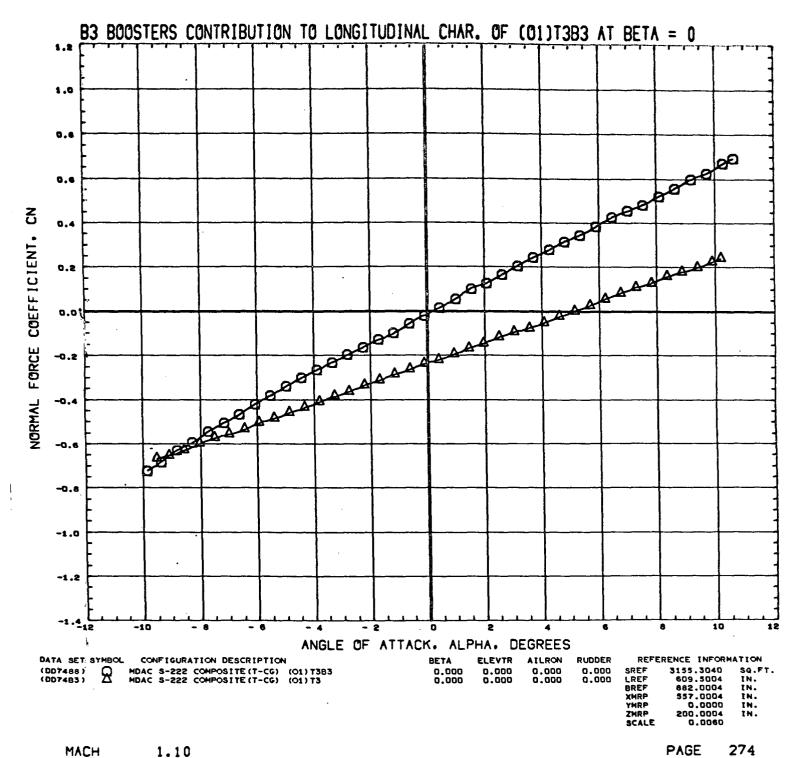
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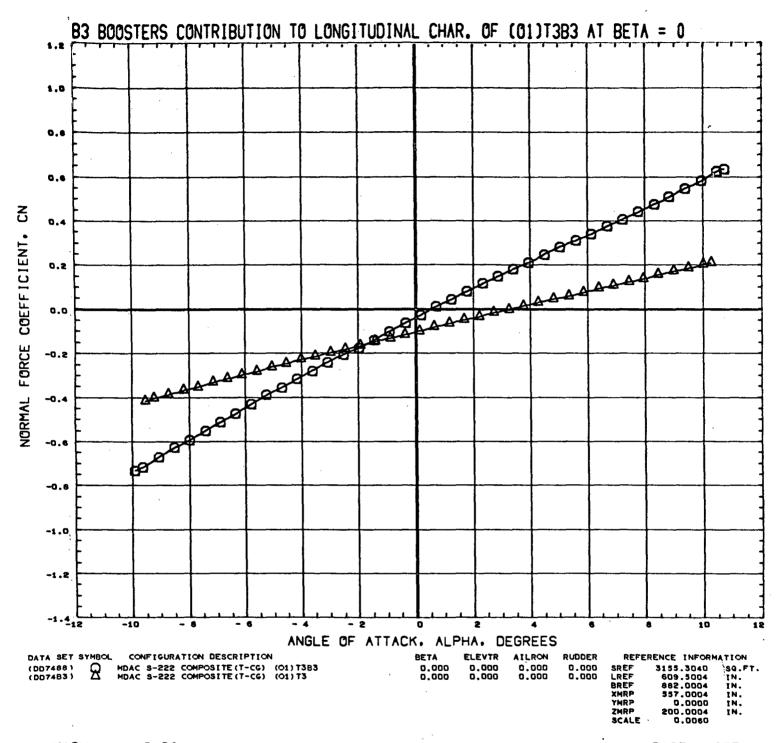
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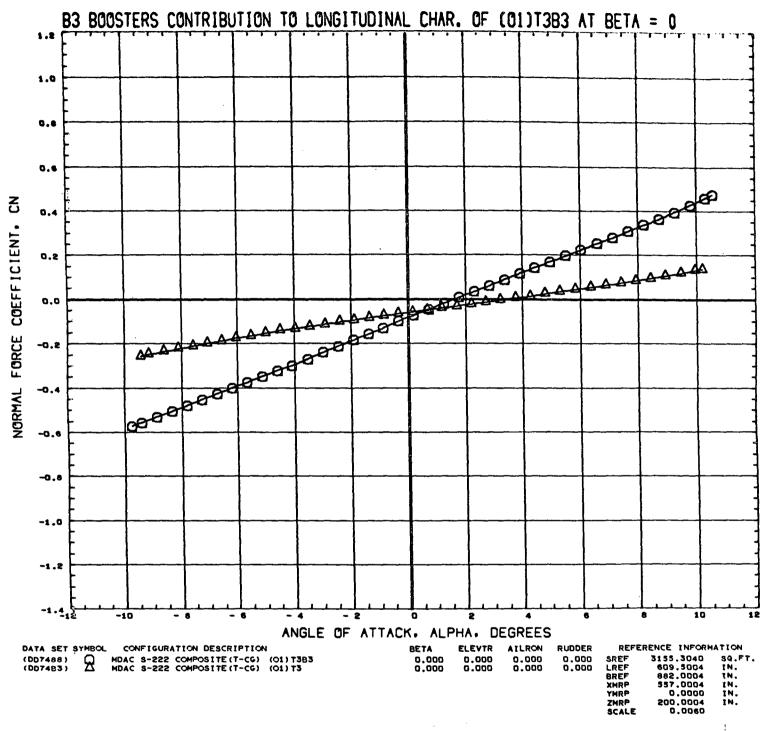




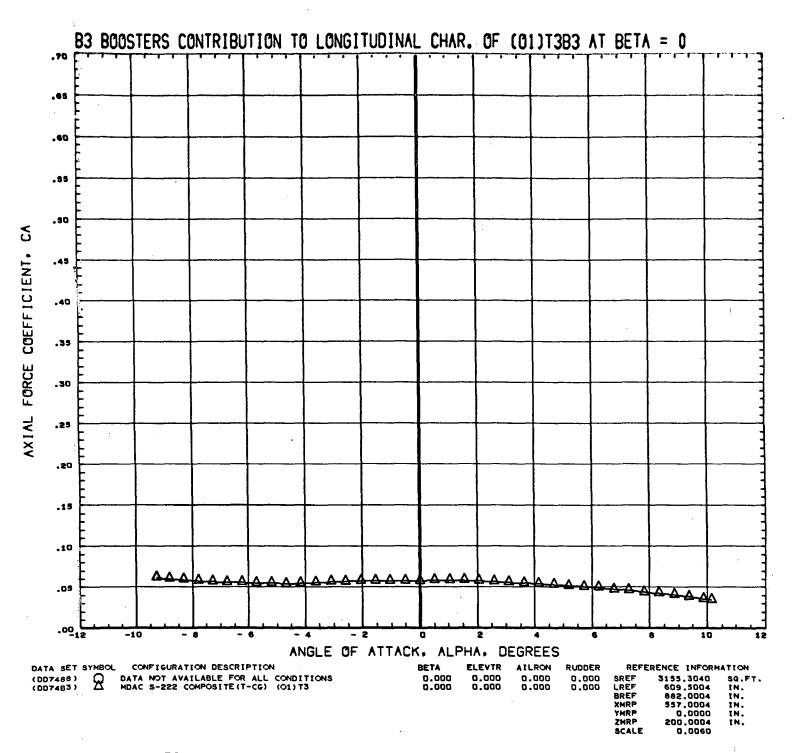


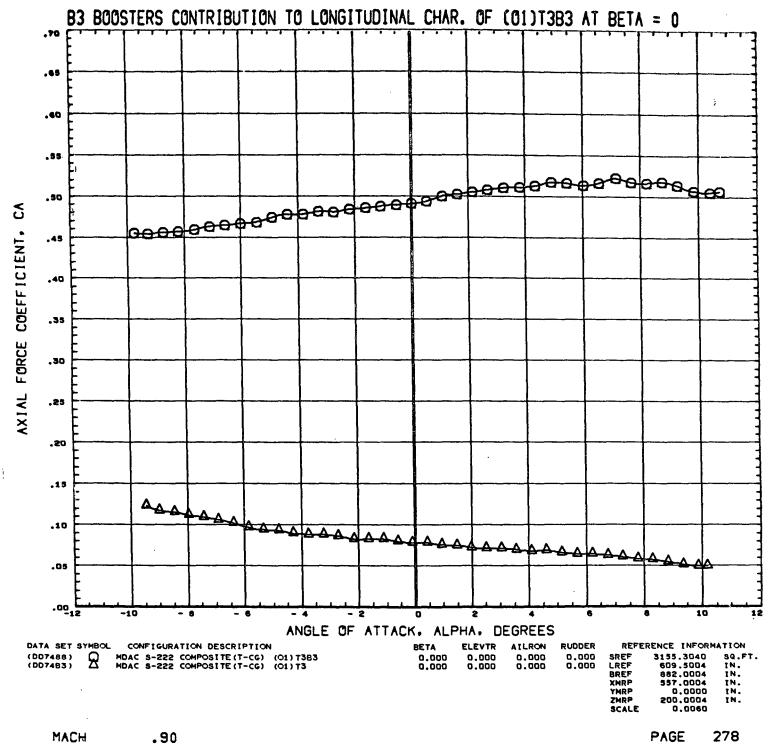


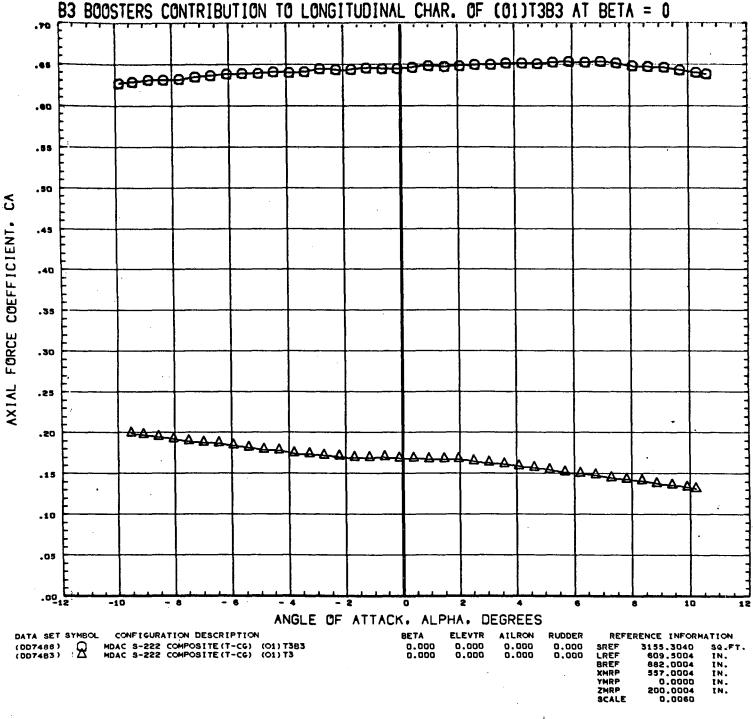
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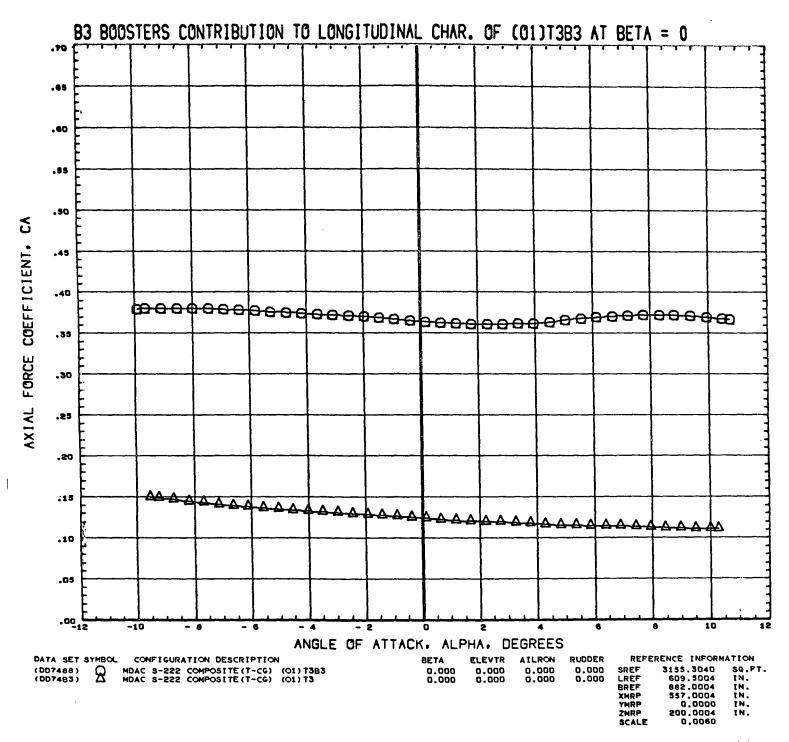


MACH 4.47



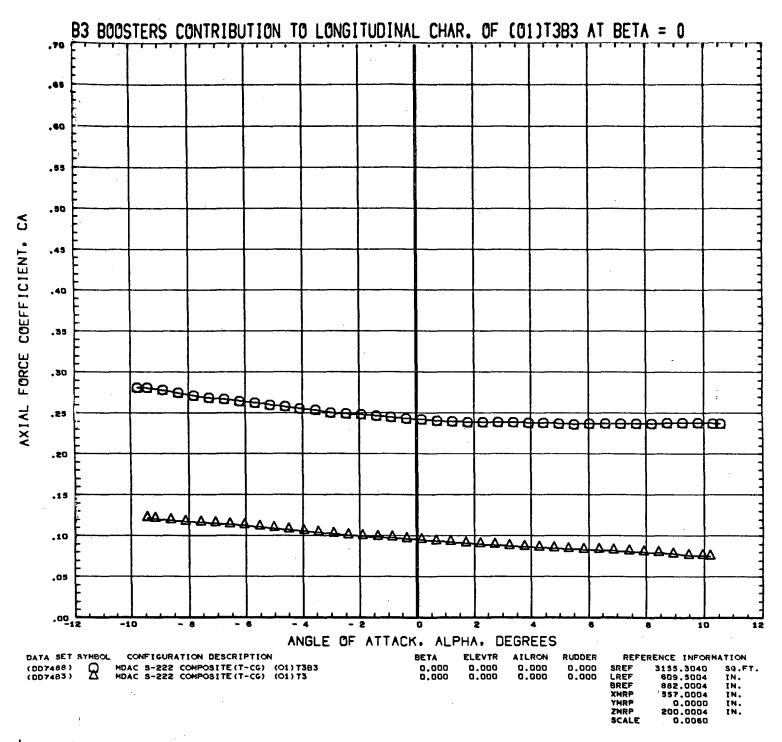




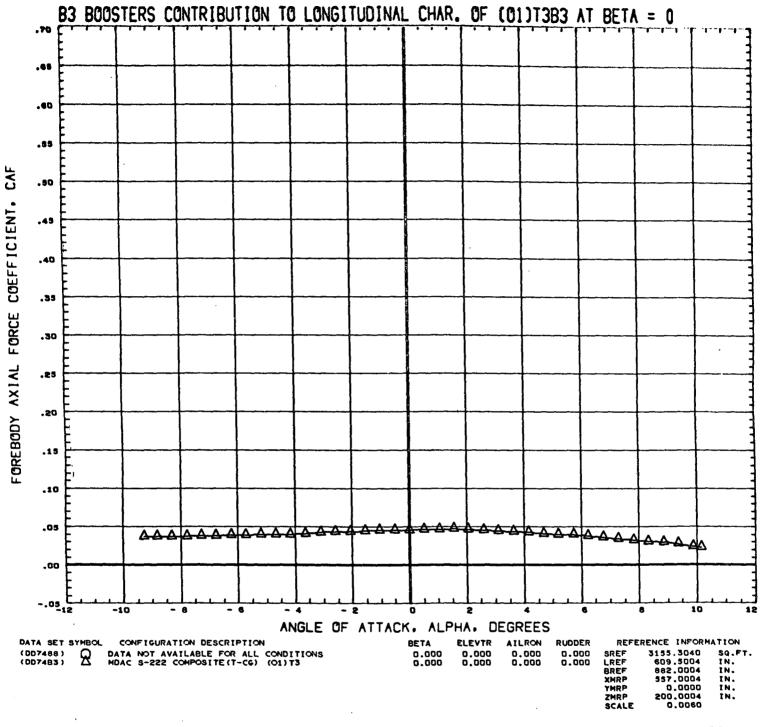


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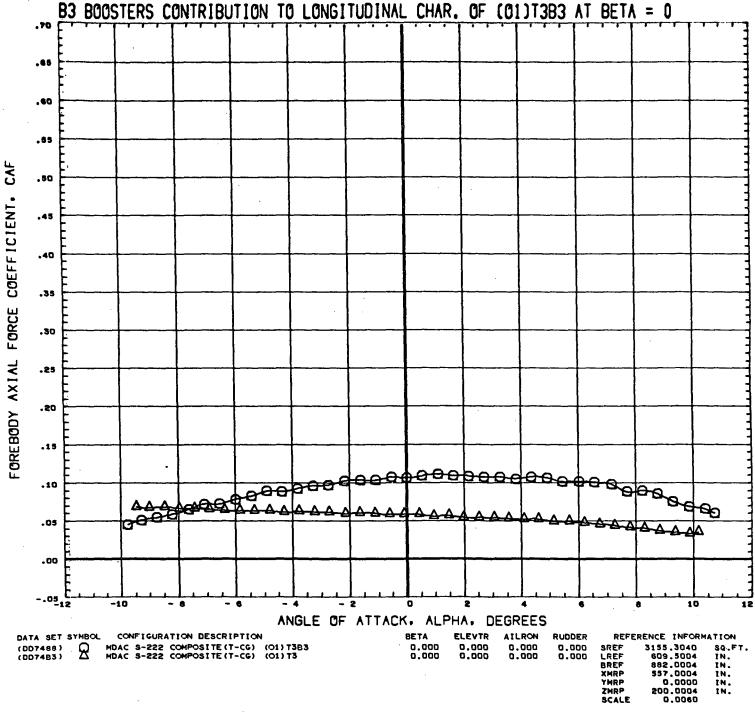


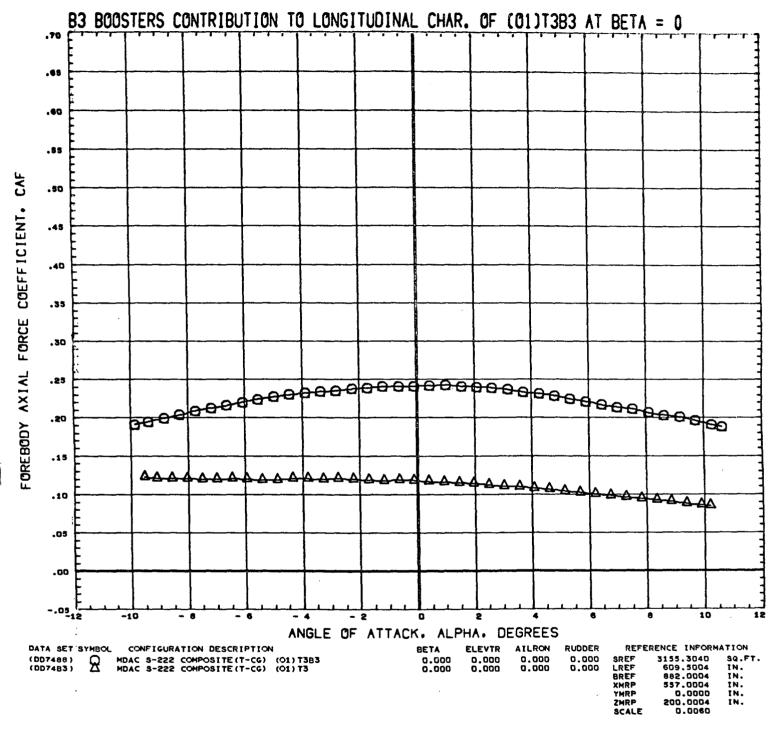
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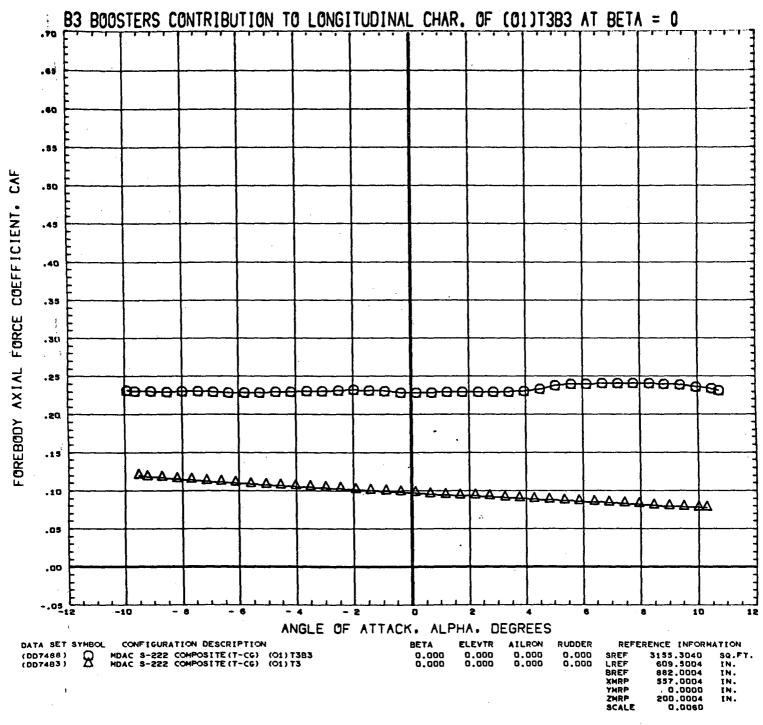
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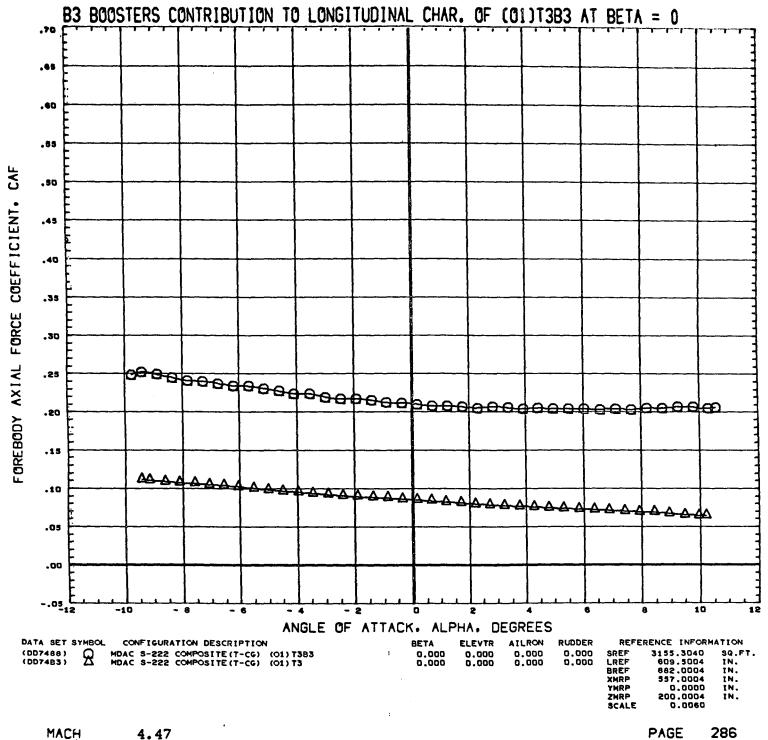


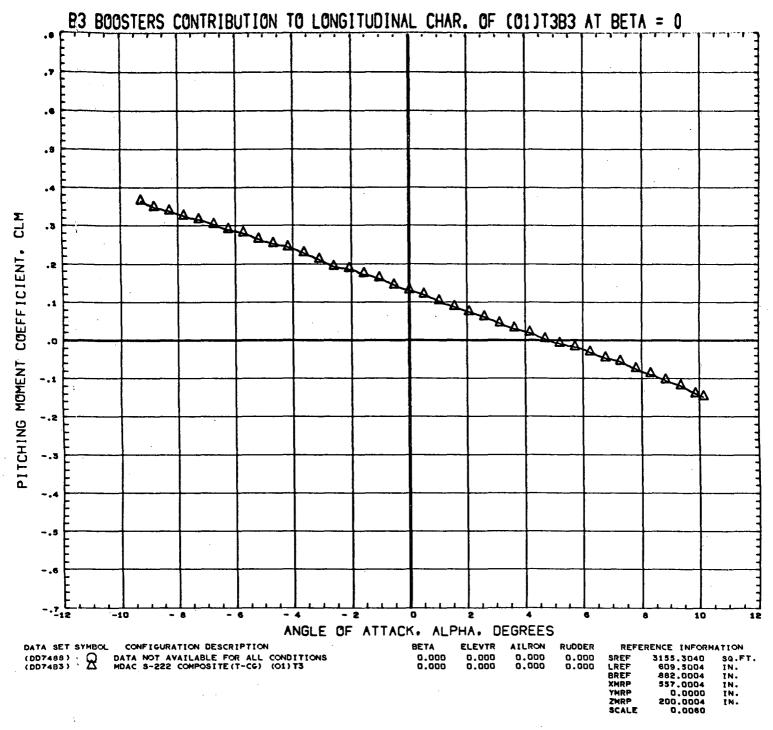


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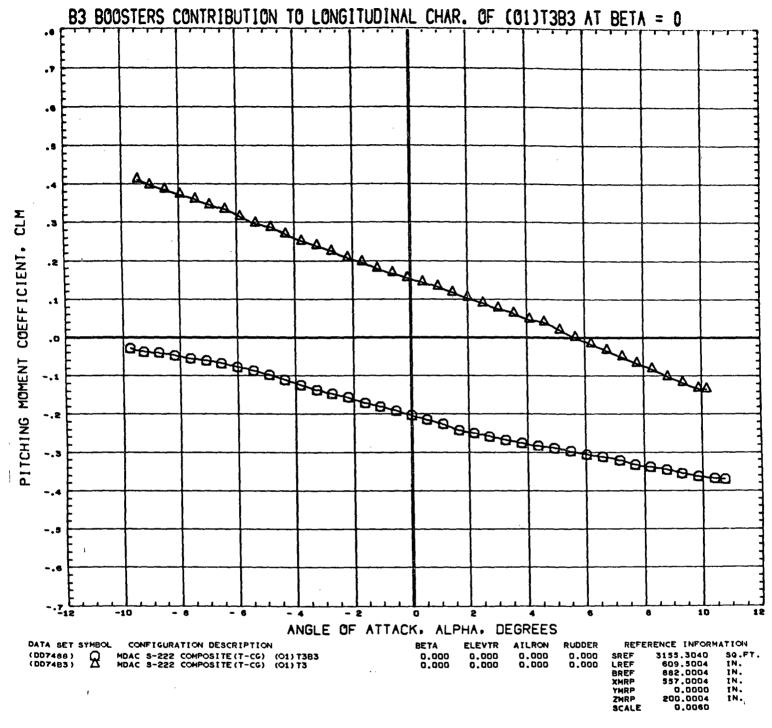


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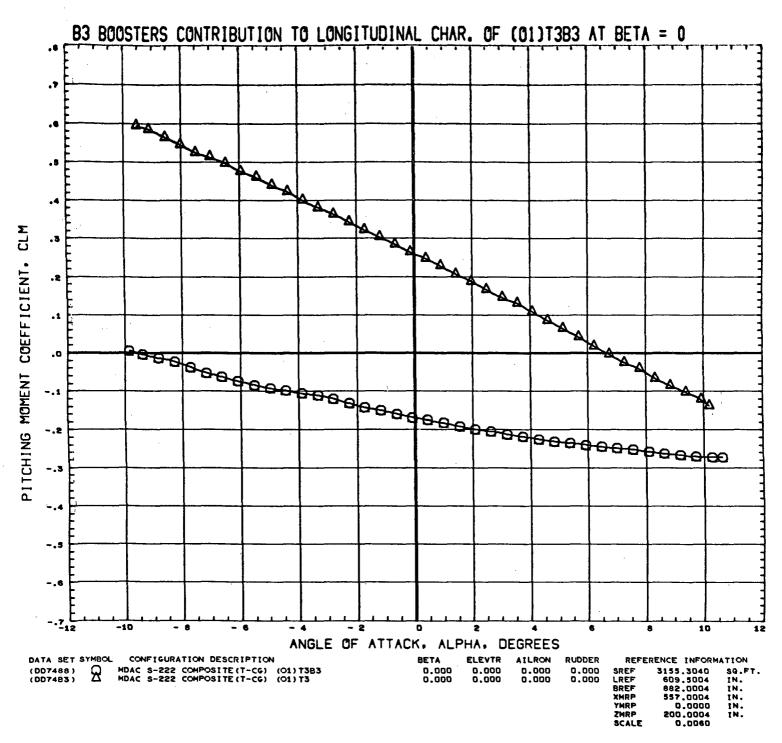


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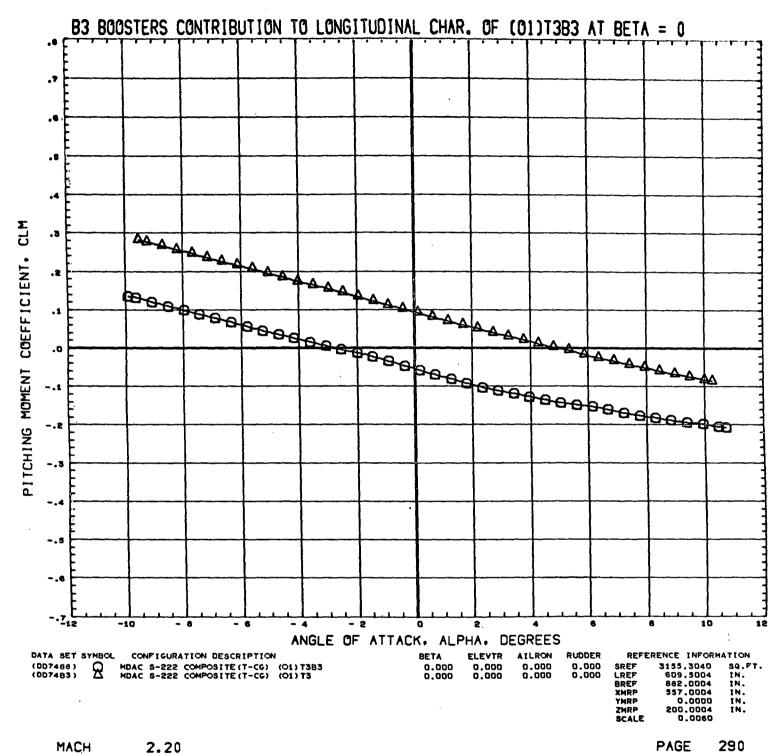


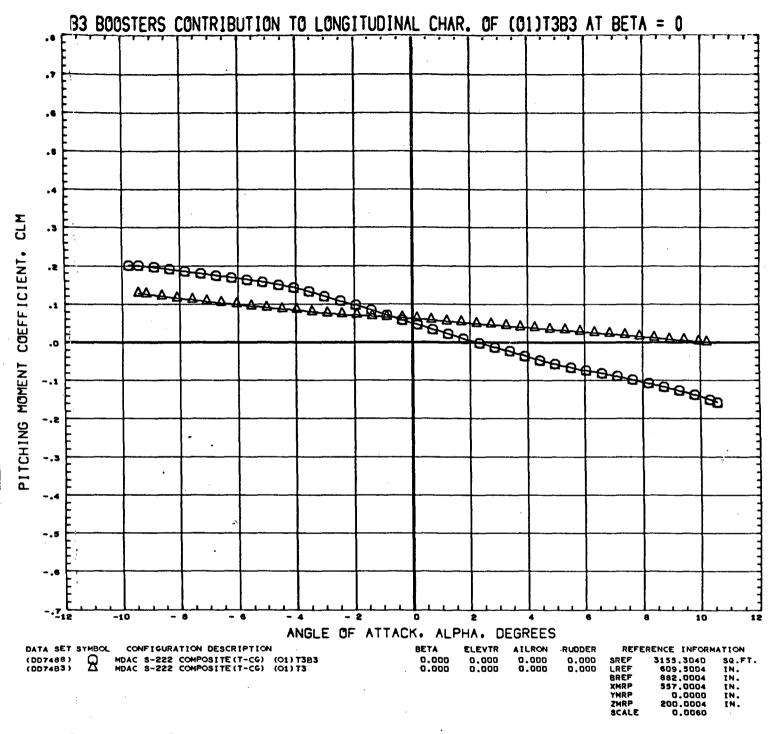
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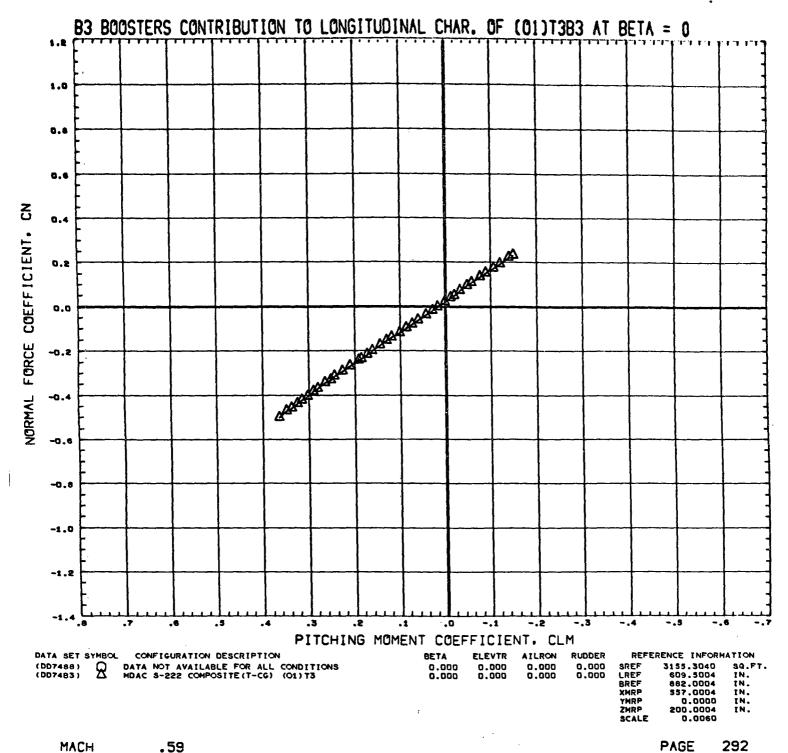


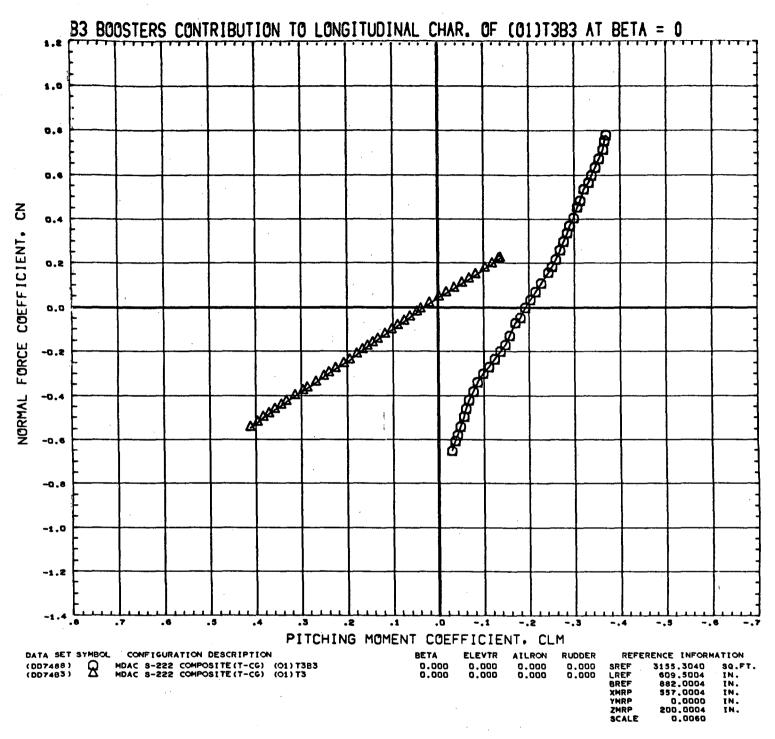
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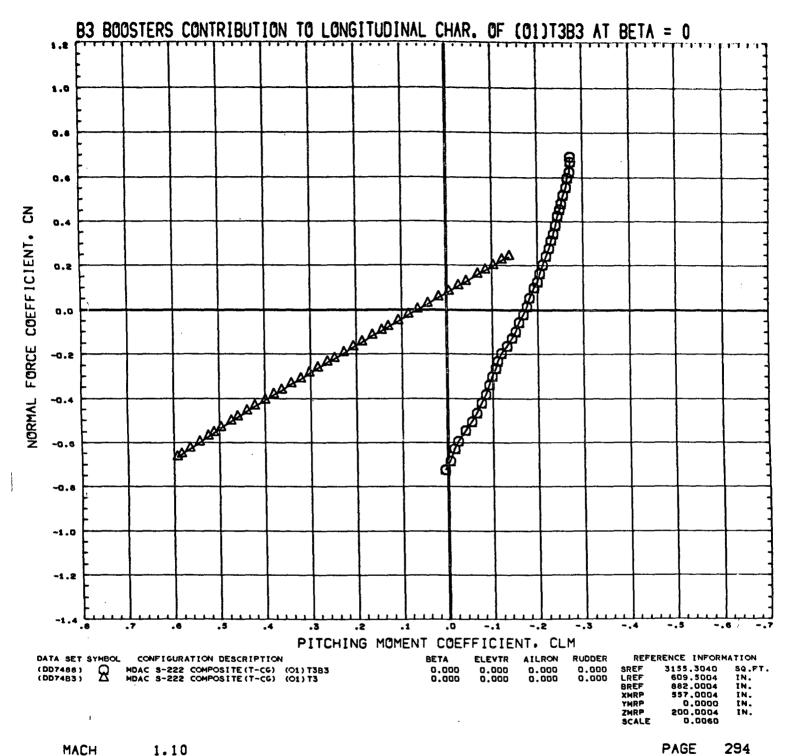


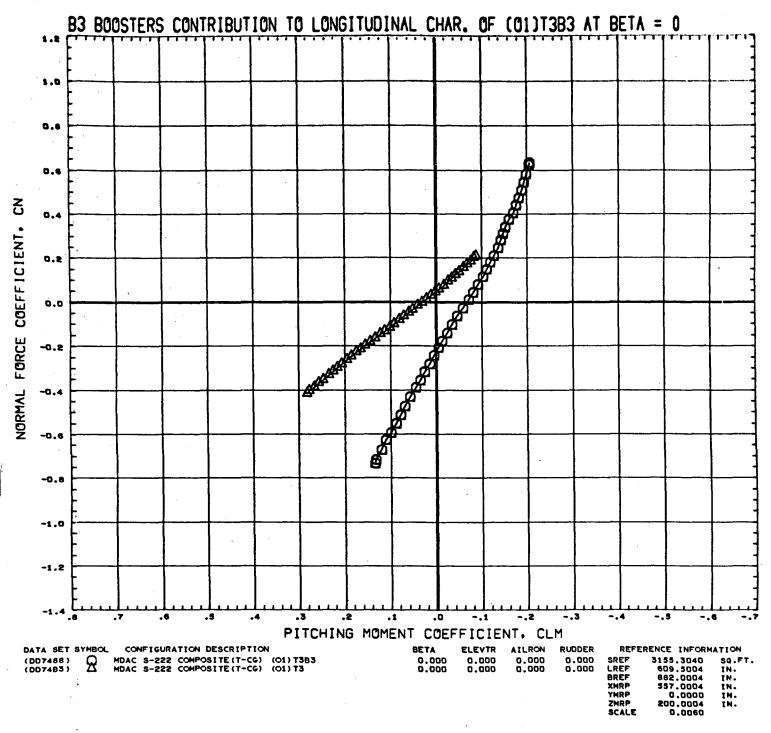
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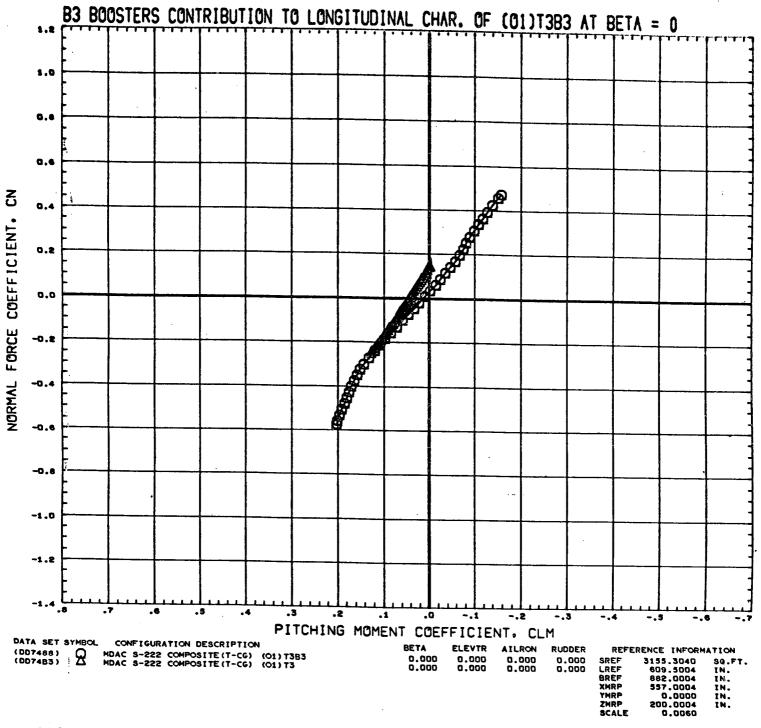


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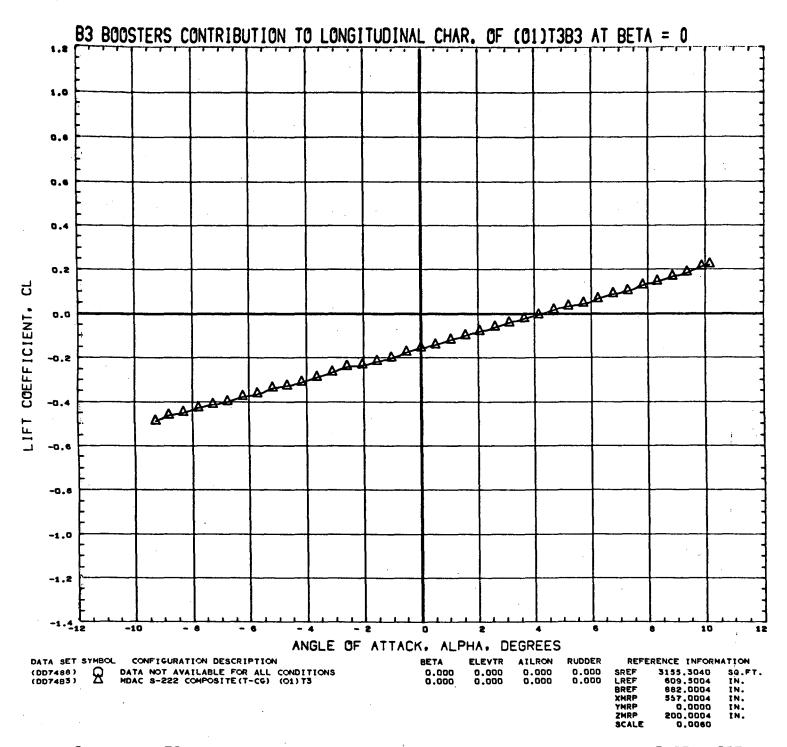


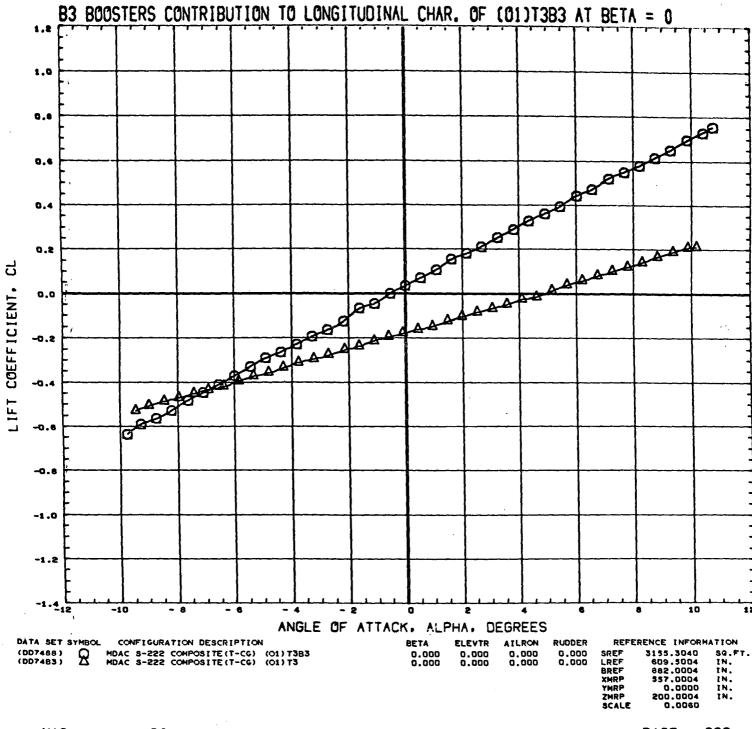


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MACH 4.47



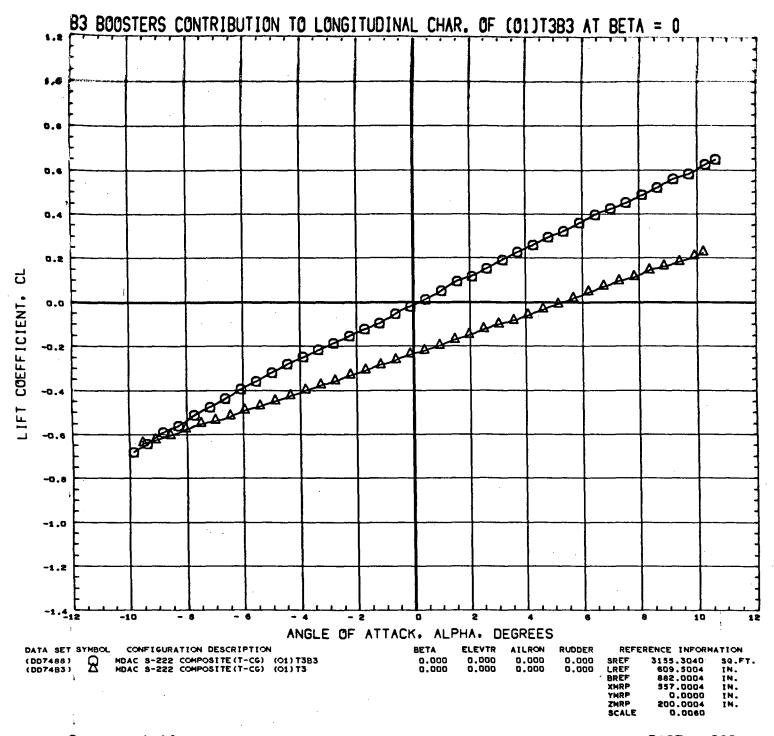


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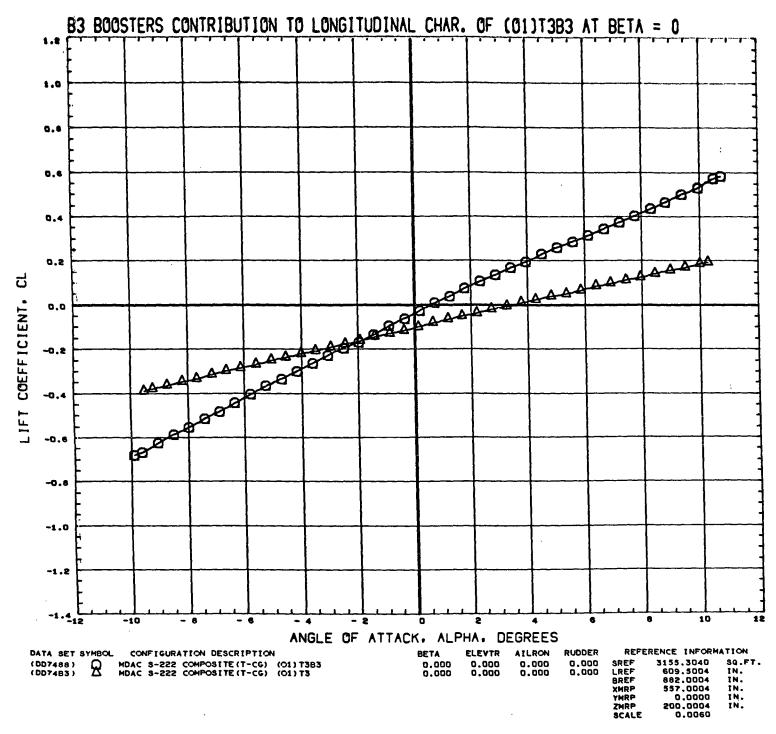
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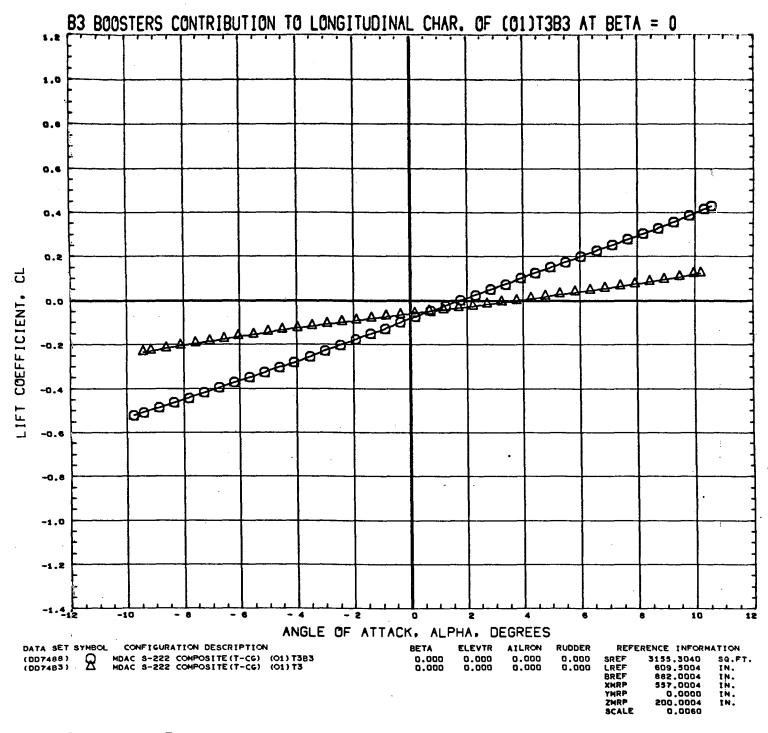
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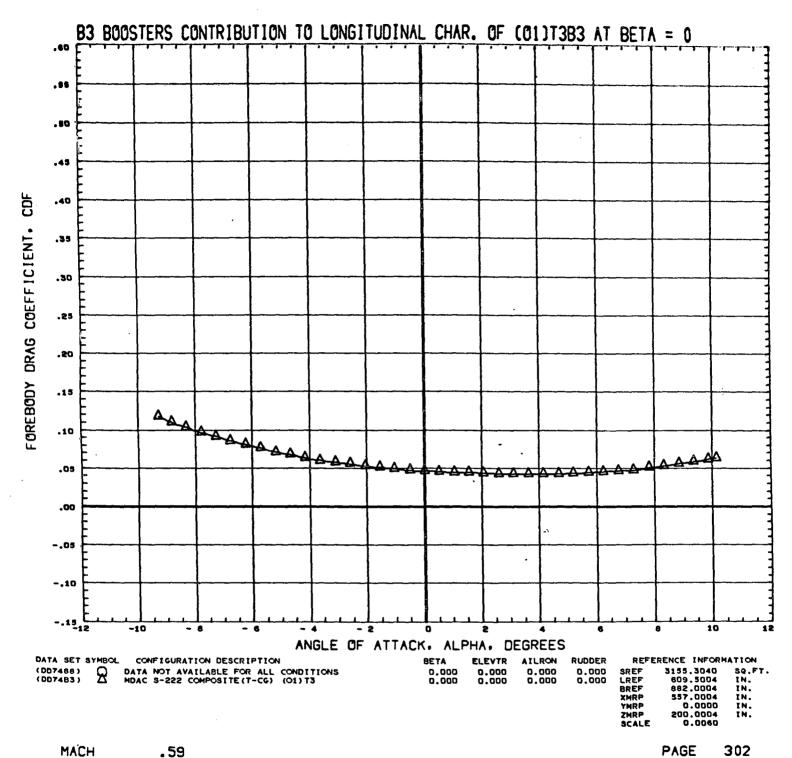
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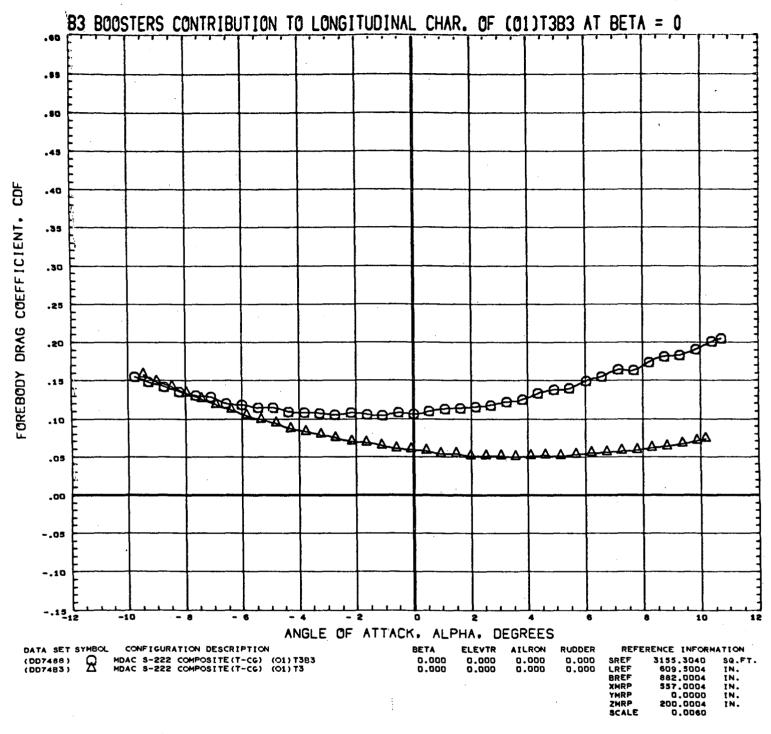


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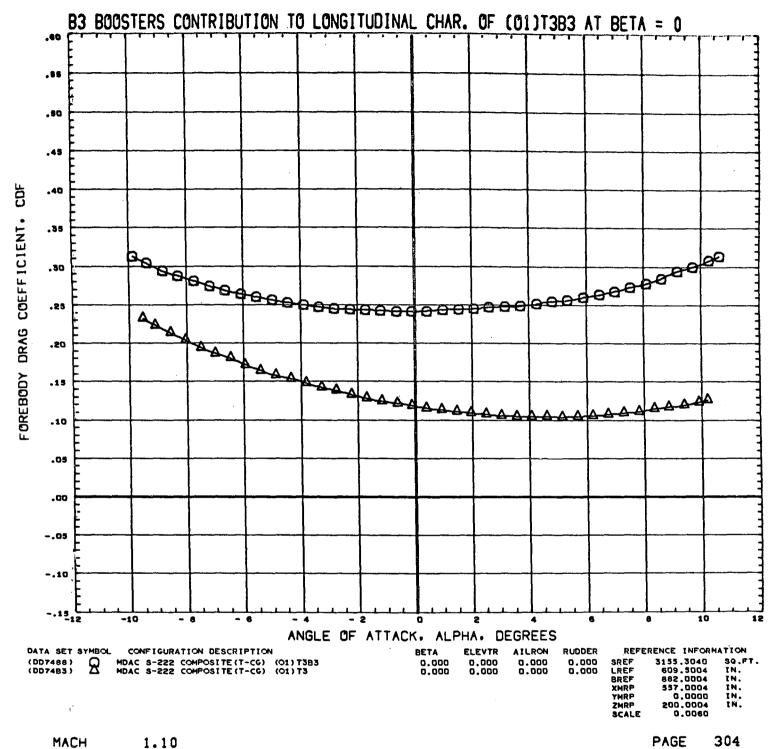


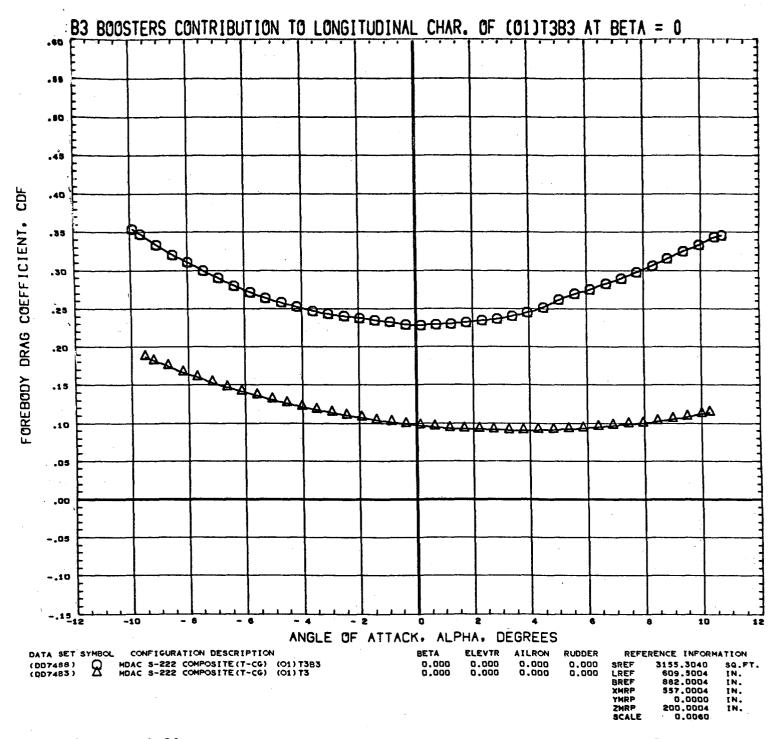
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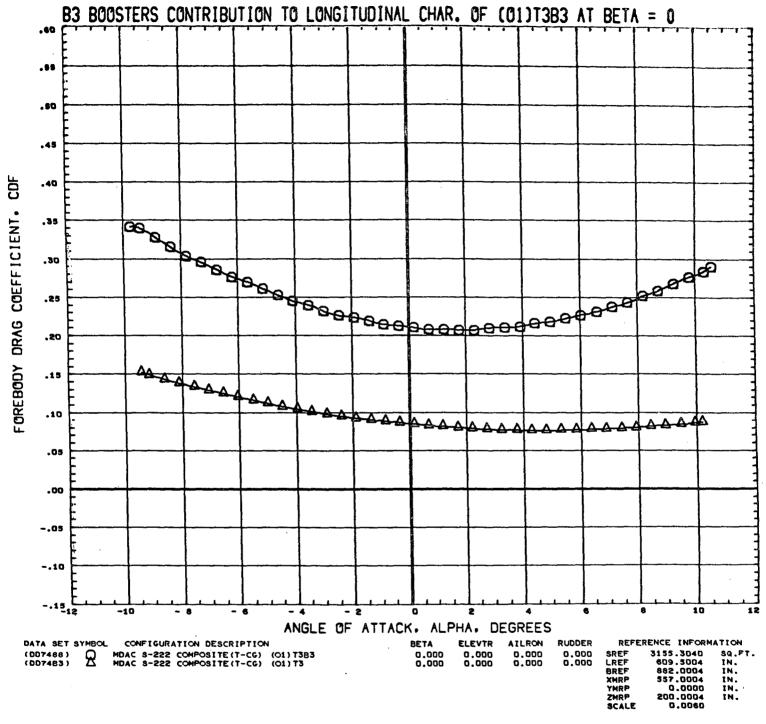


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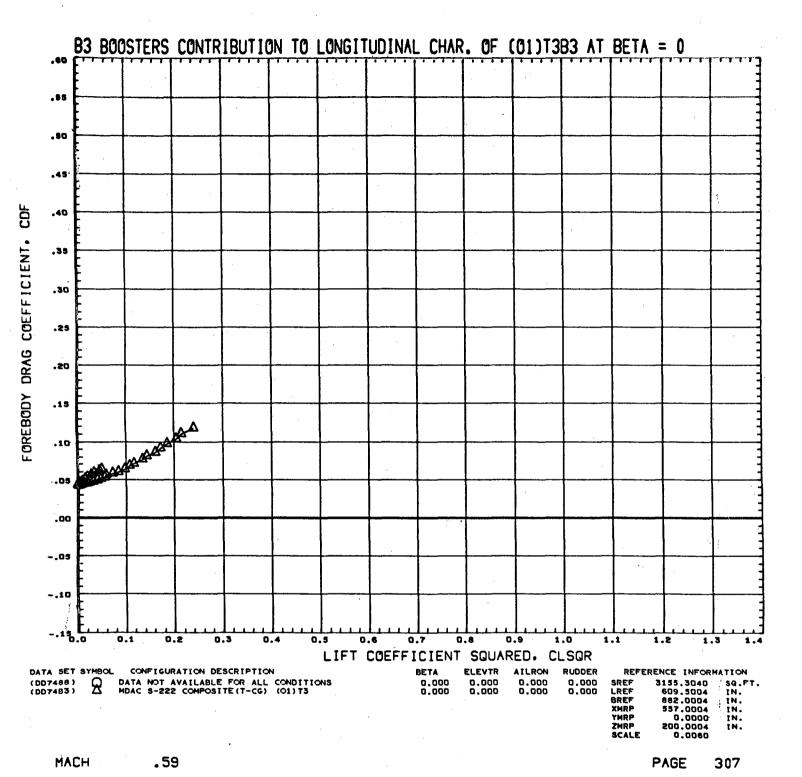


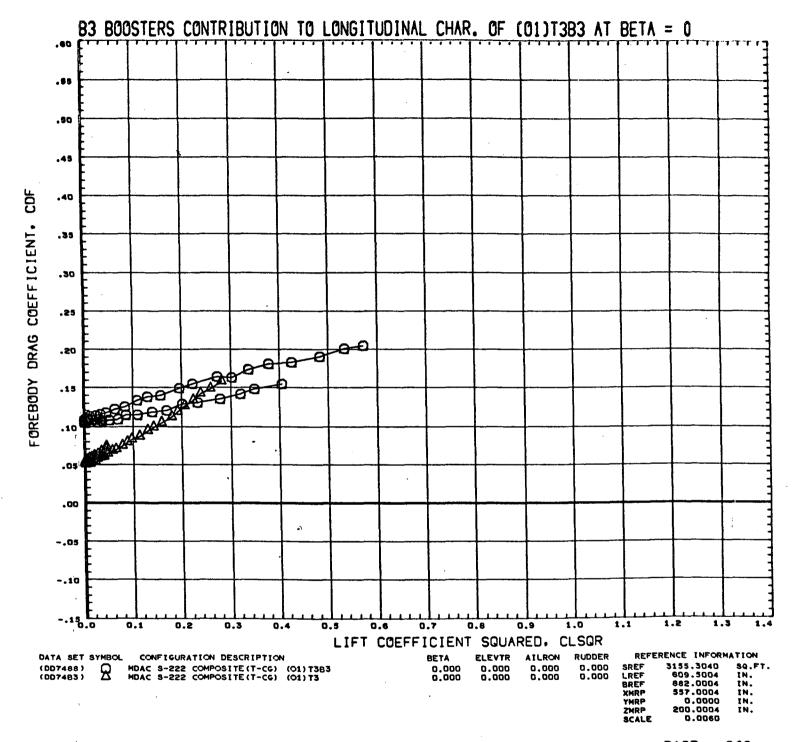
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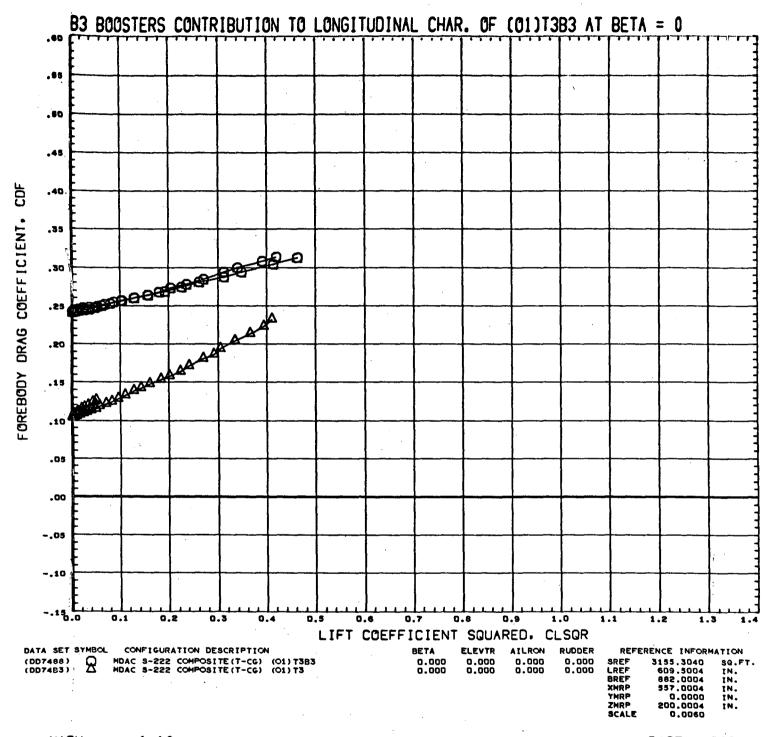
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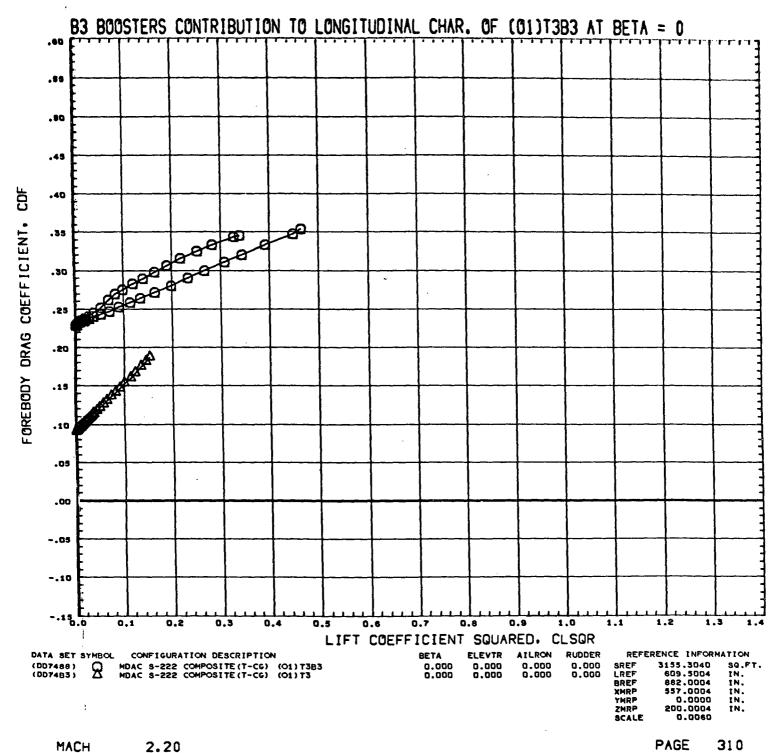


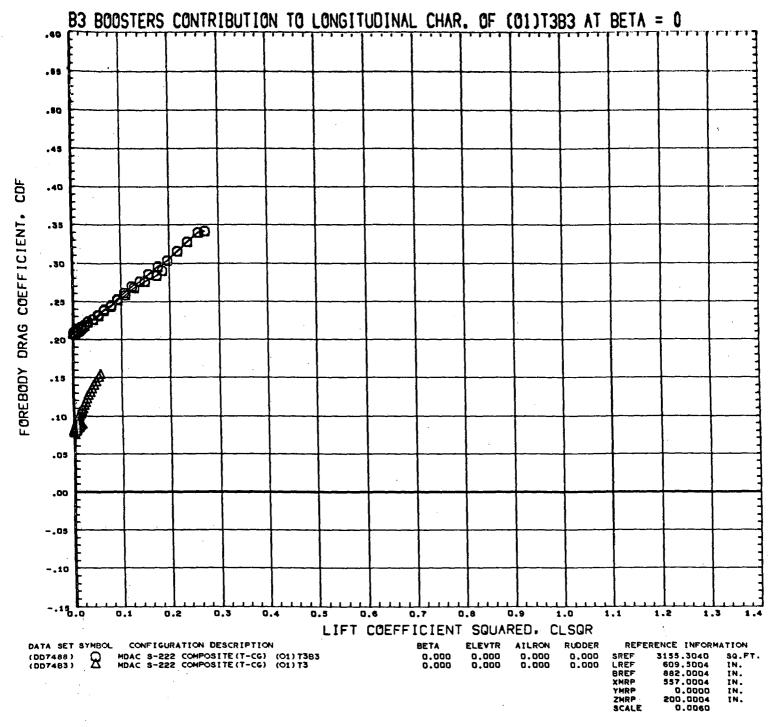


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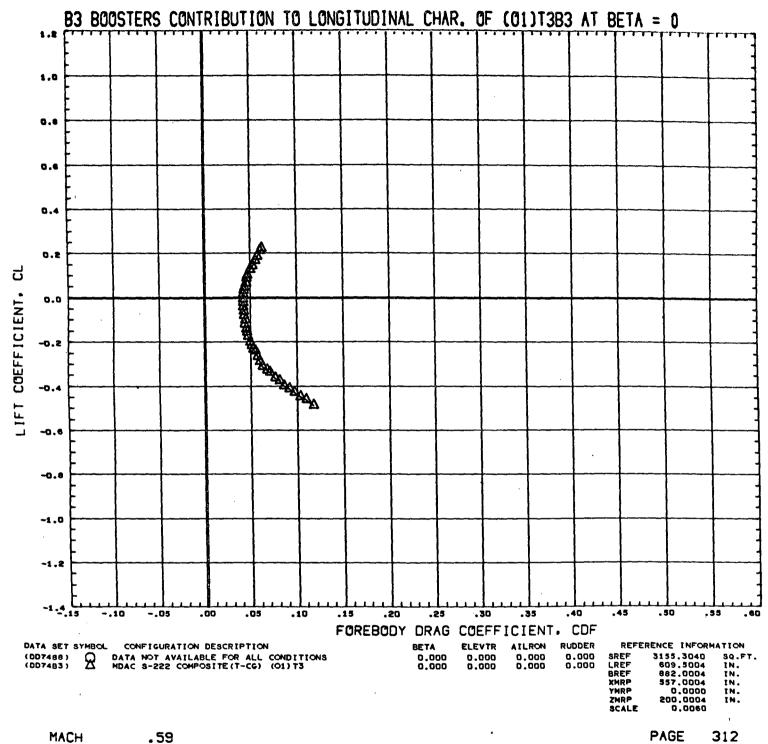


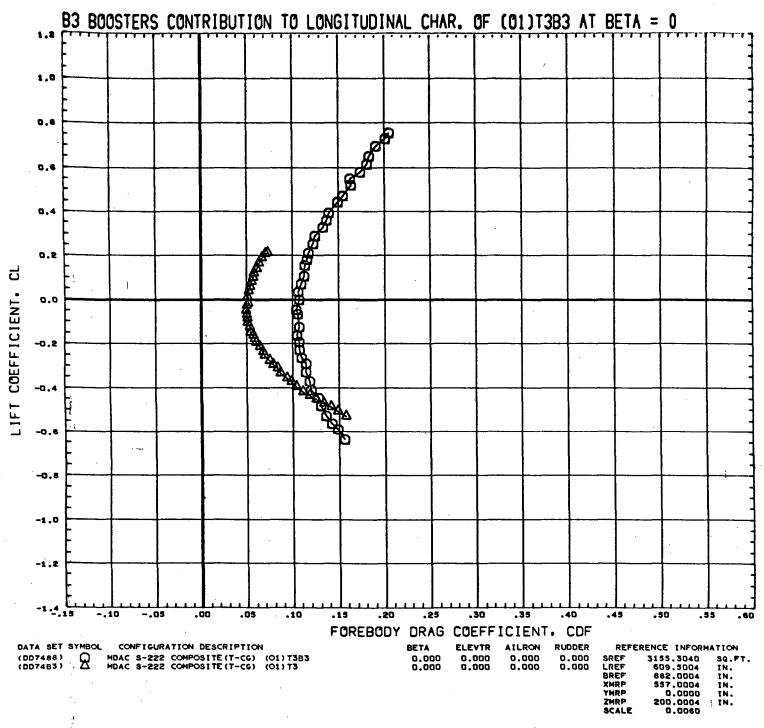
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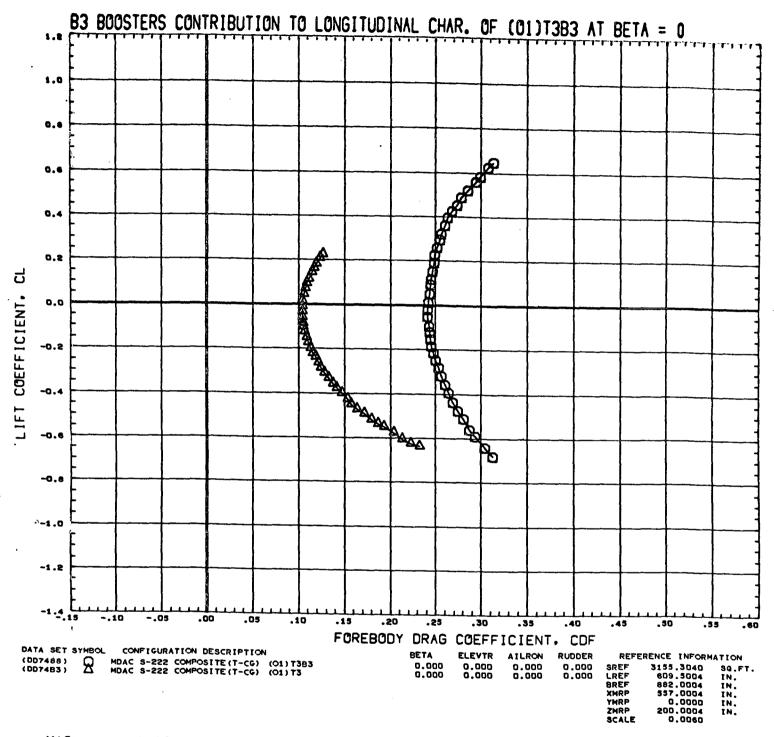


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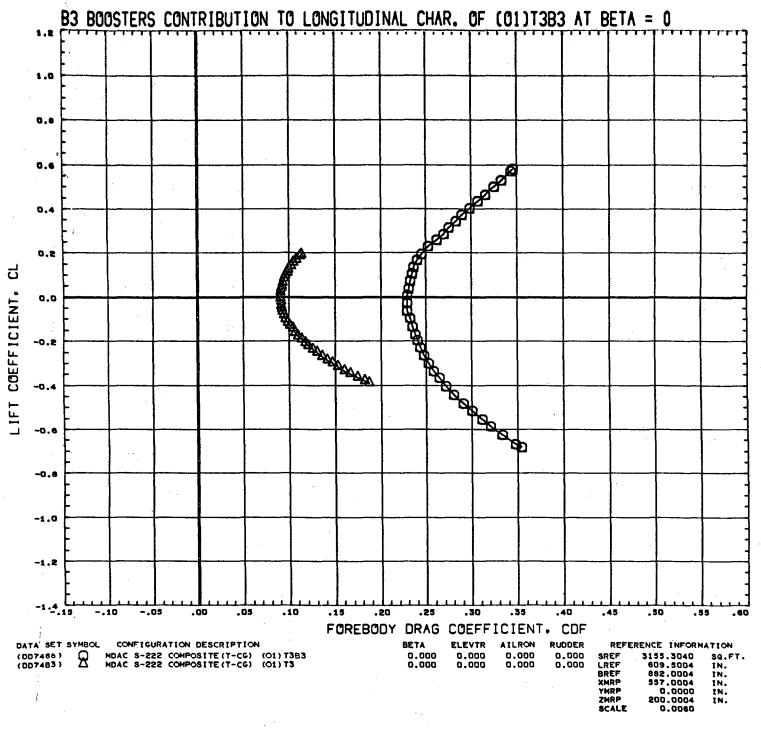




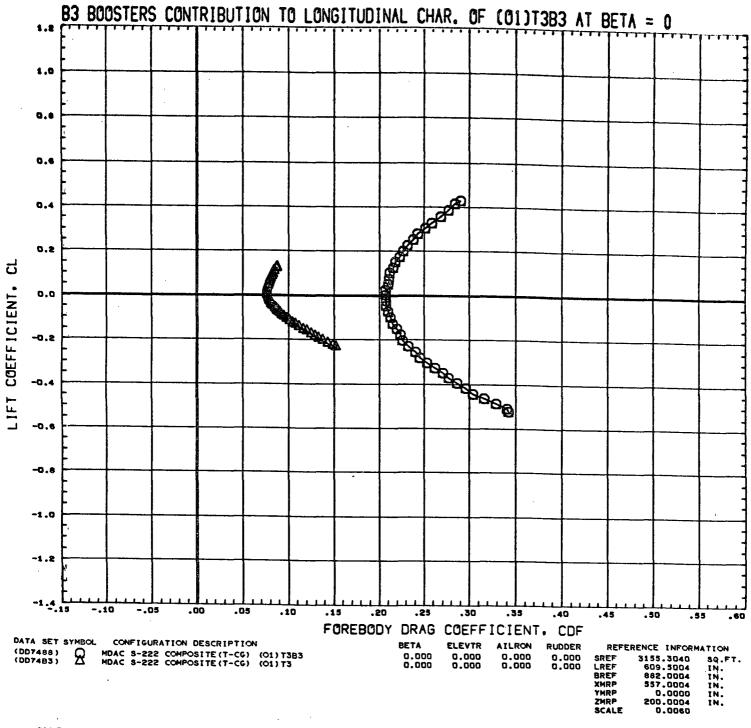
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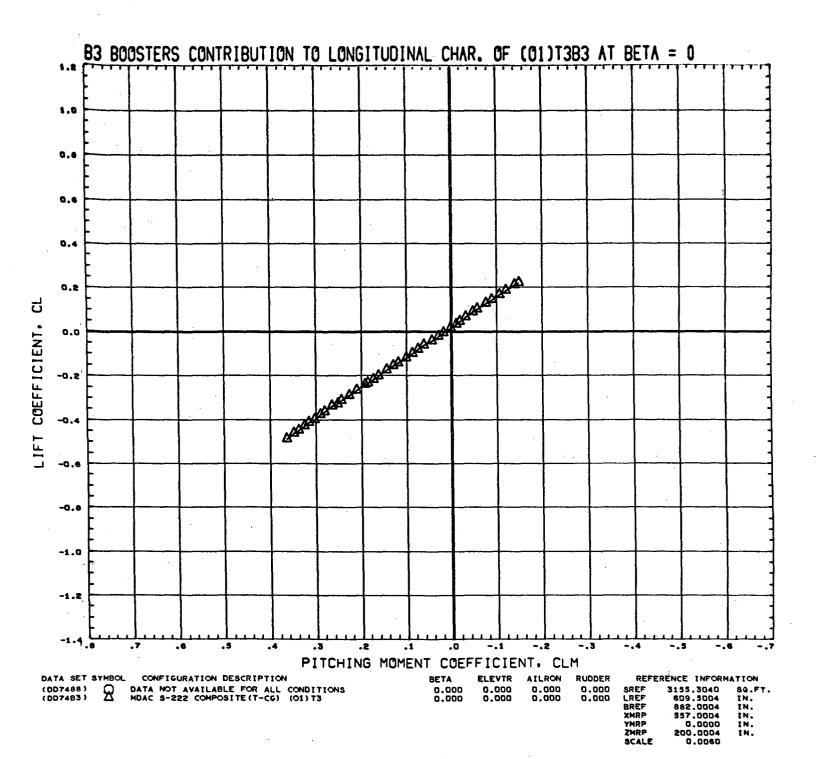
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MACH 2.20

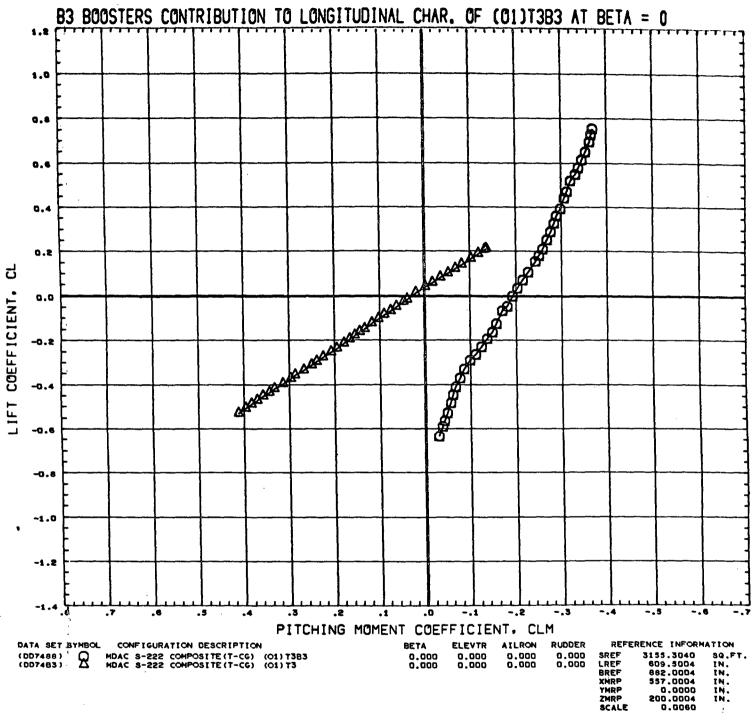


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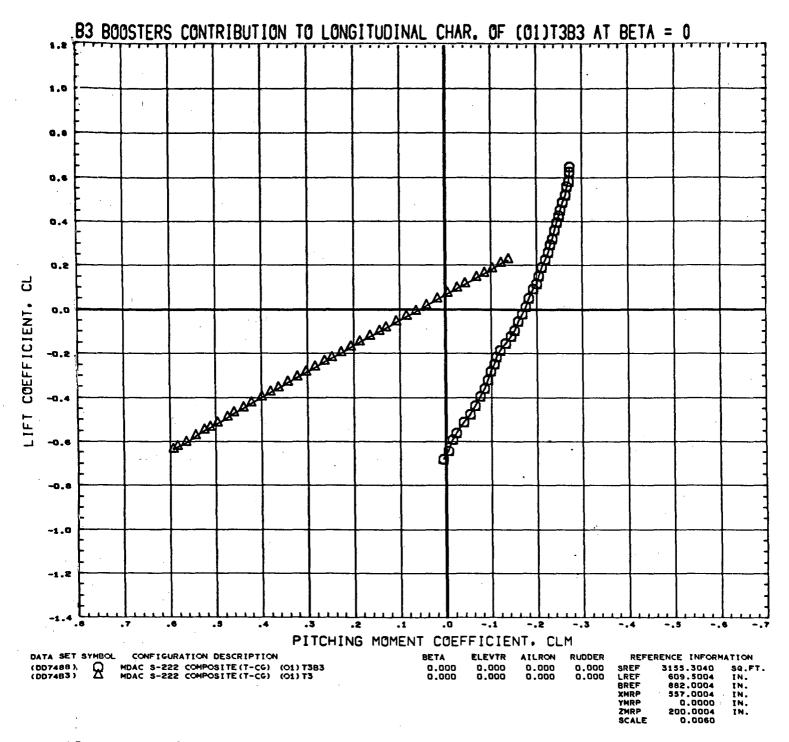


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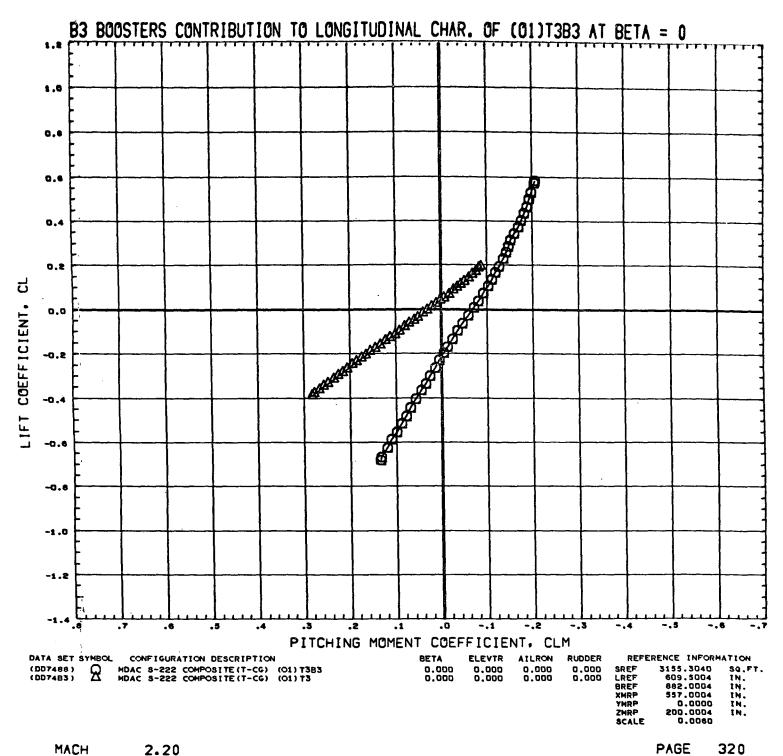
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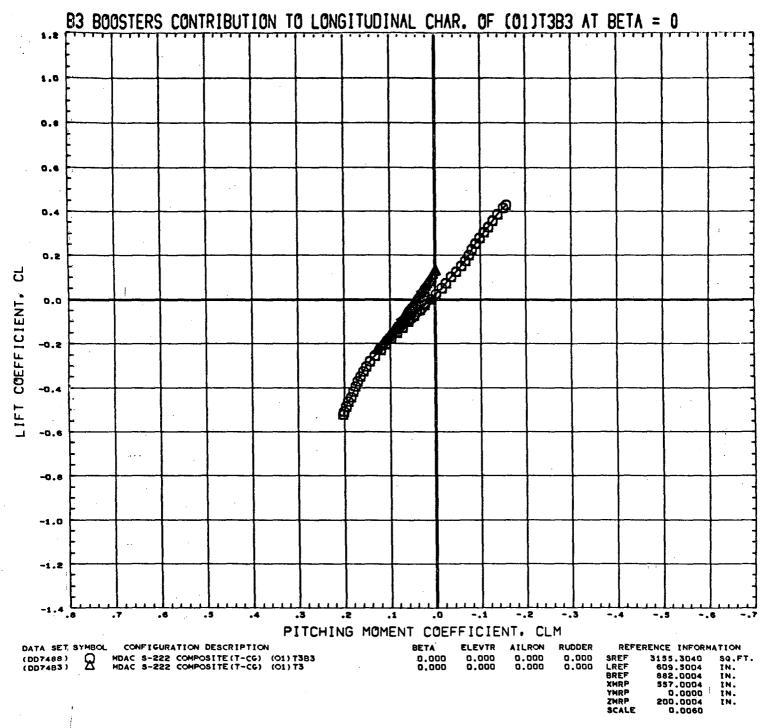


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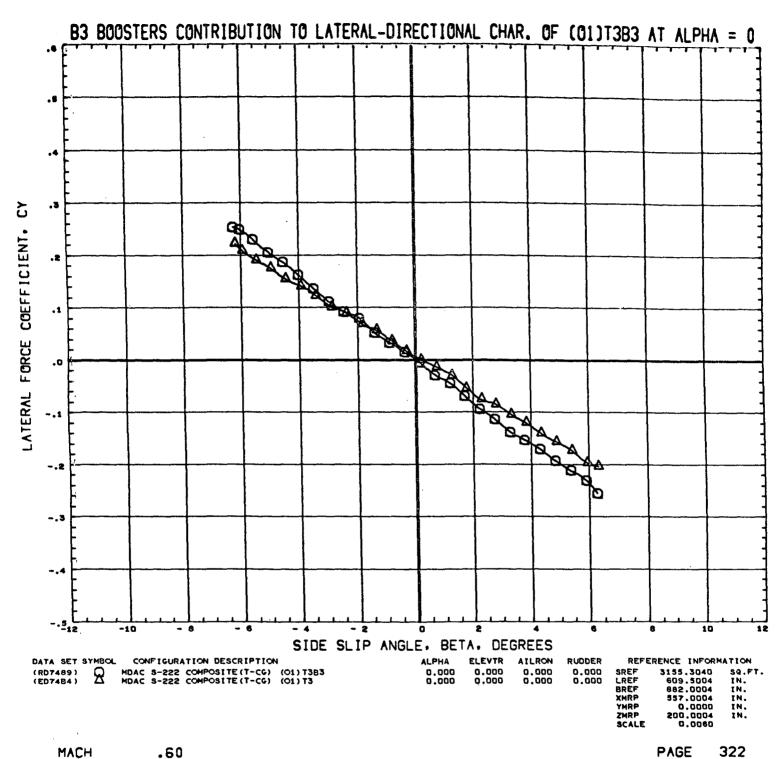


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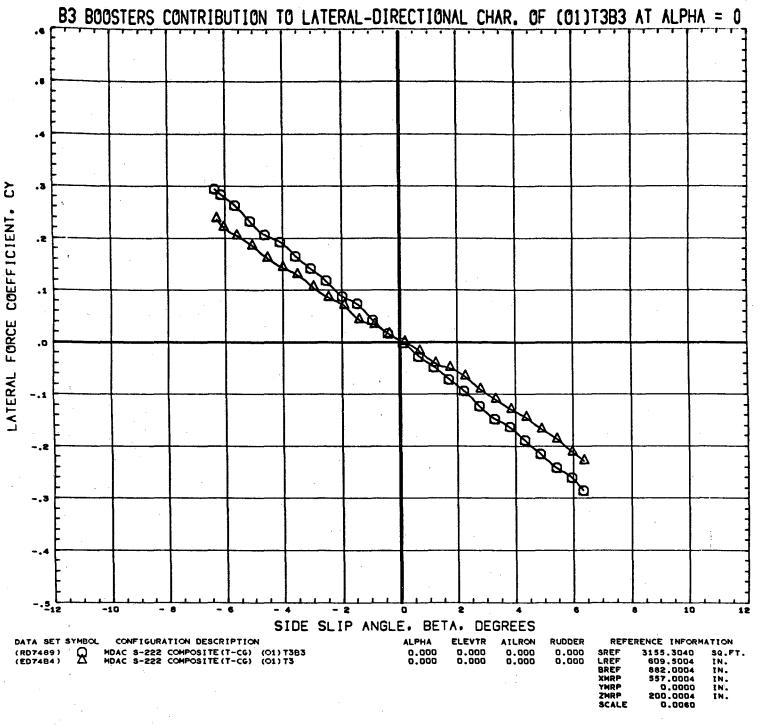


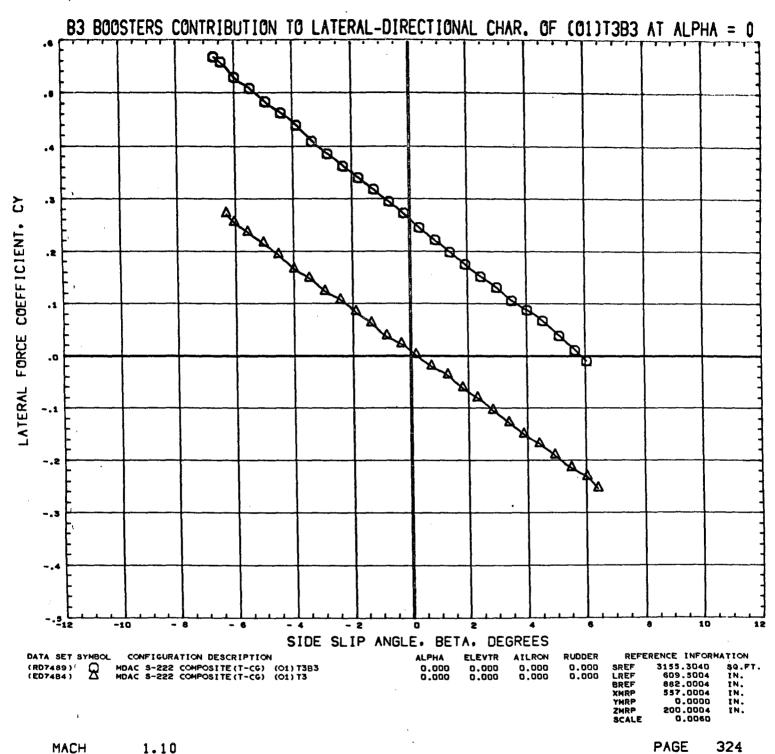


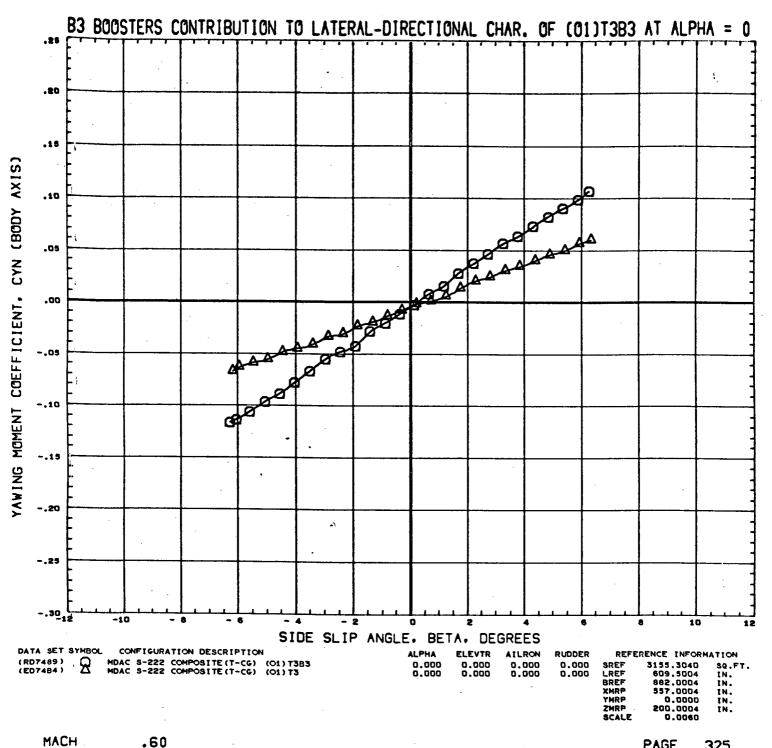
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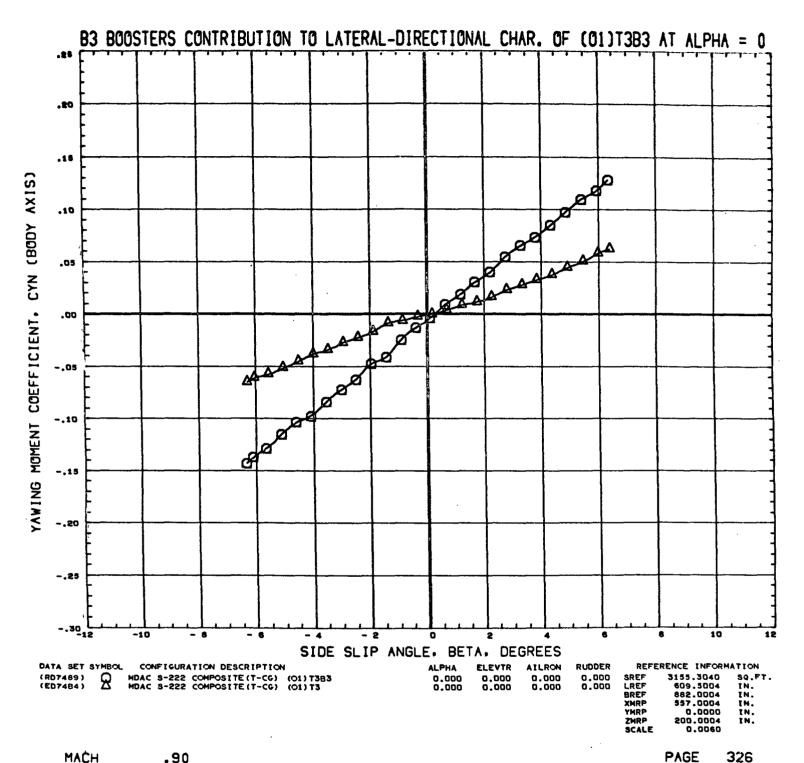
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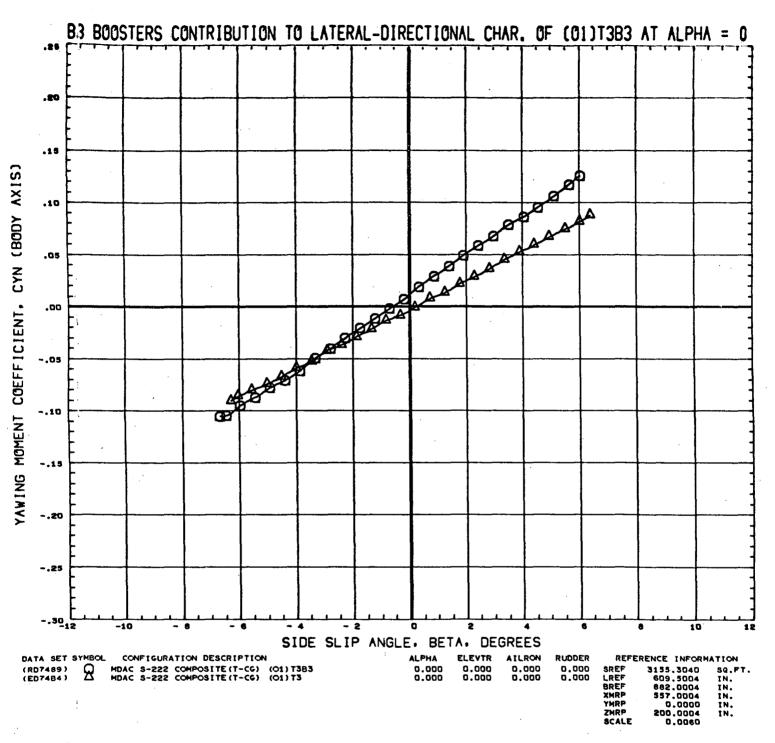


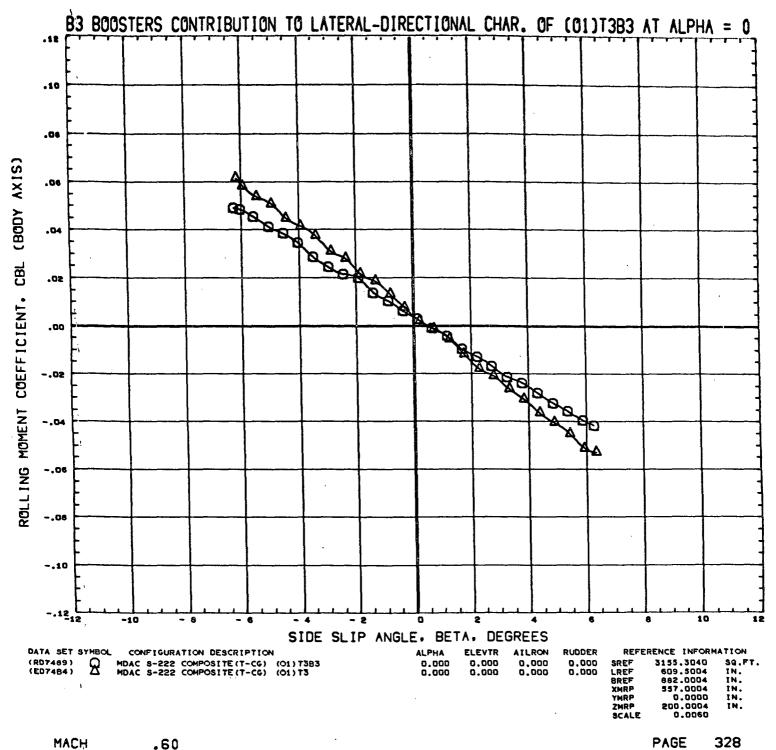
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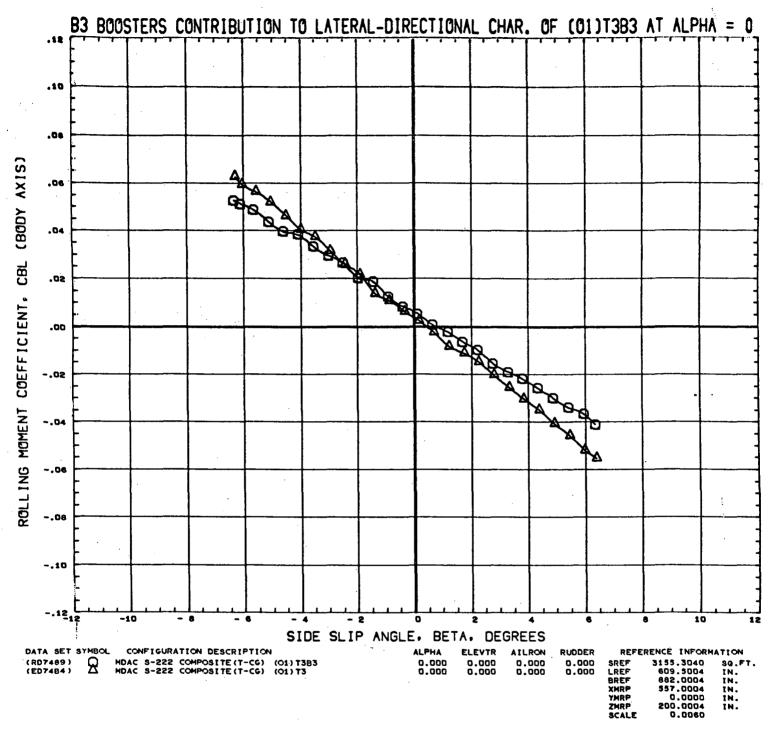


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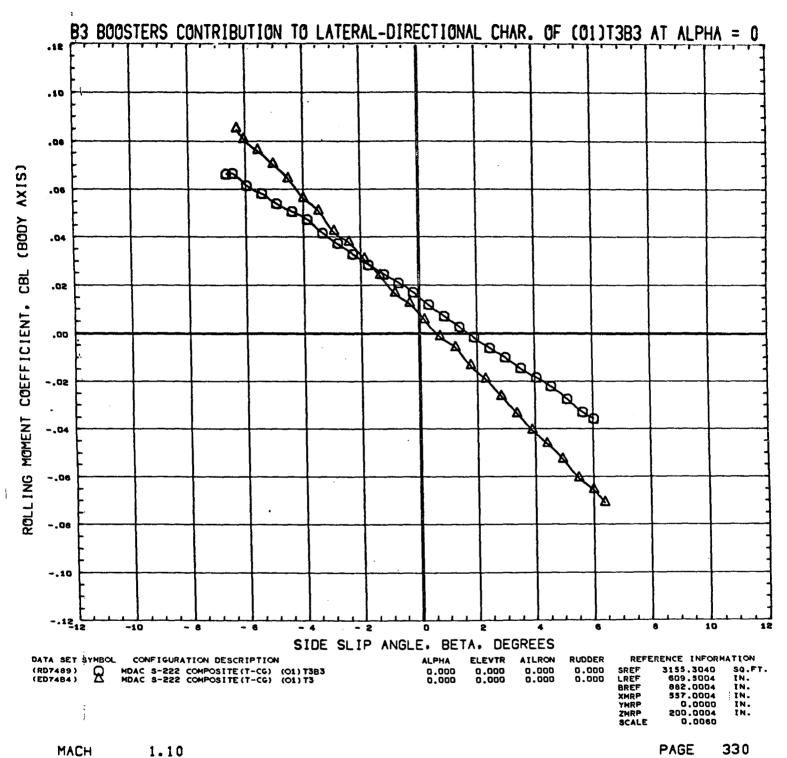


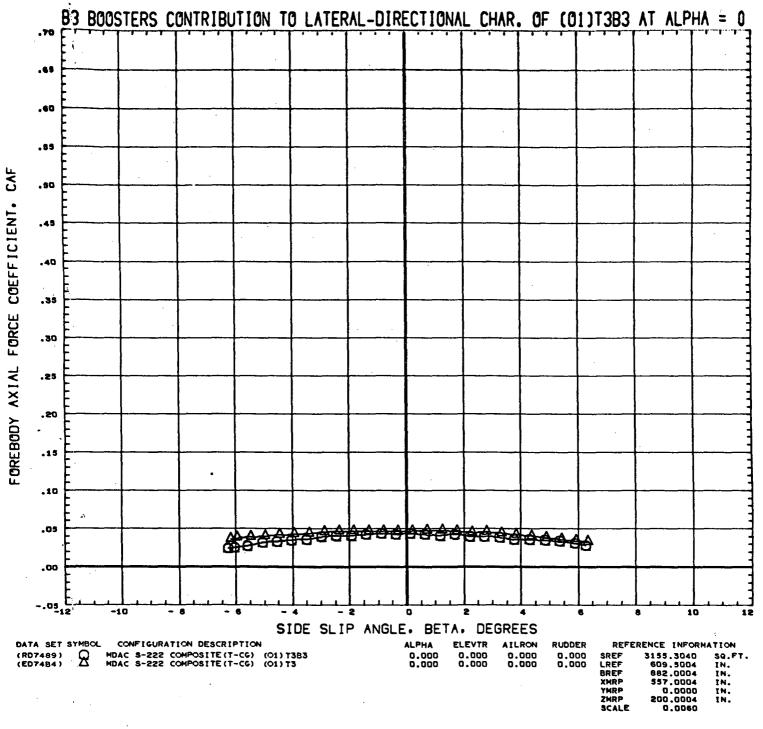
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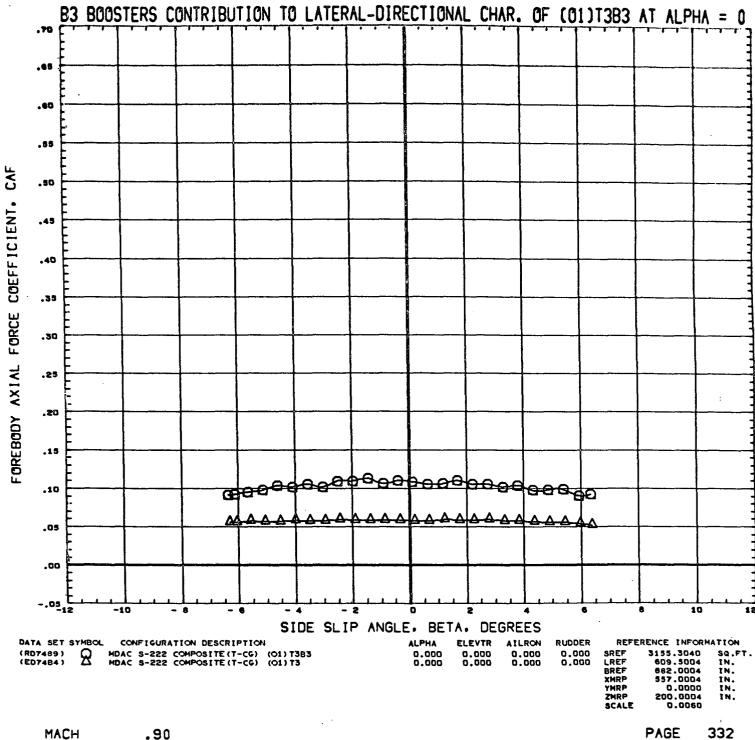
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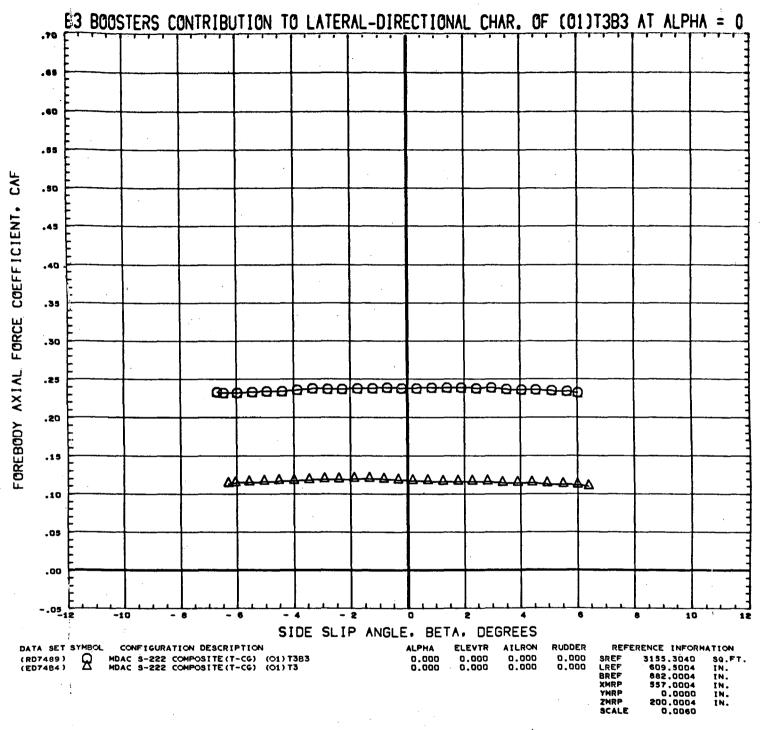


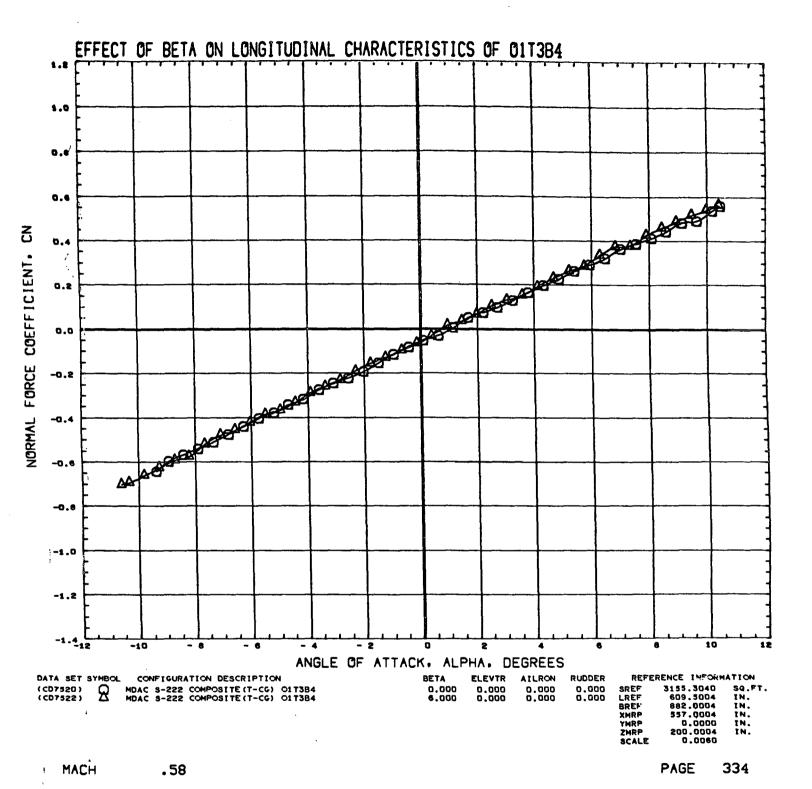


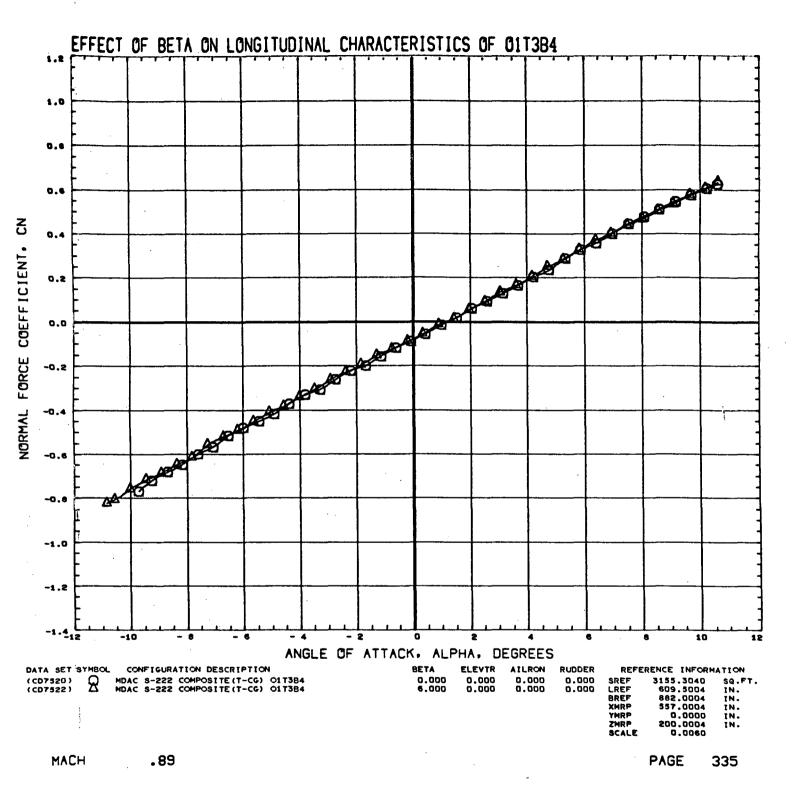


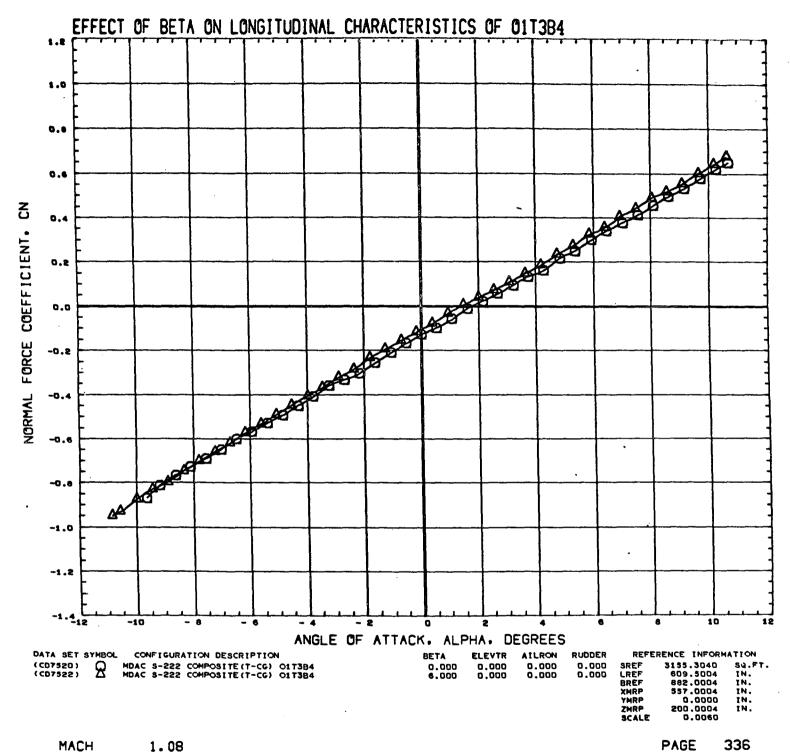
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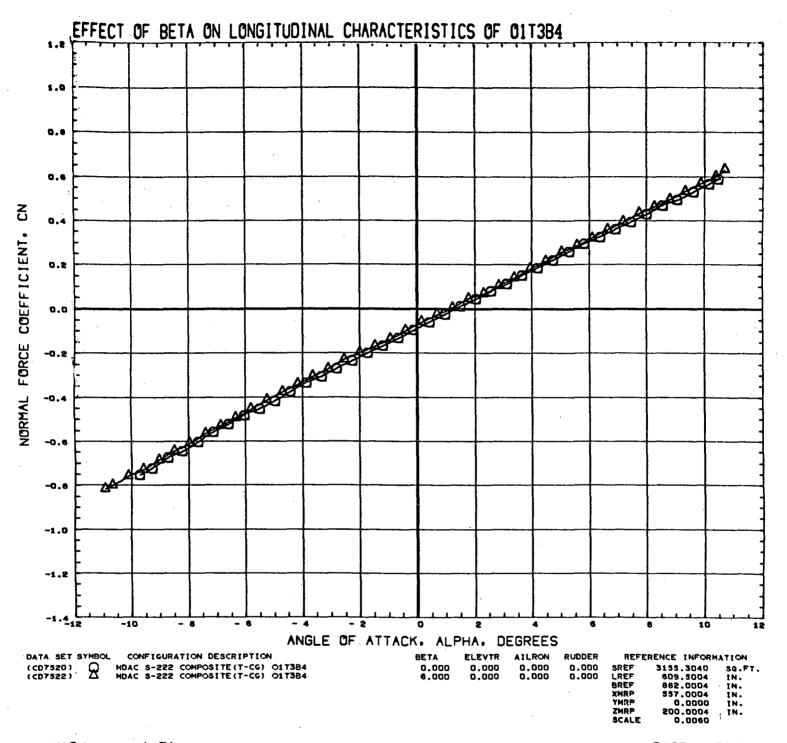
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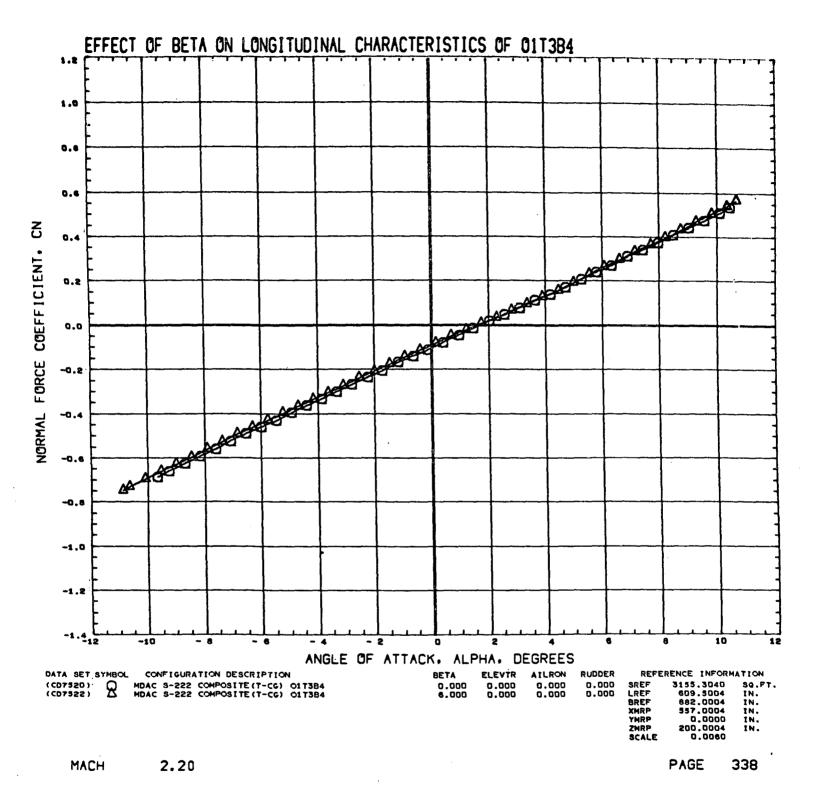




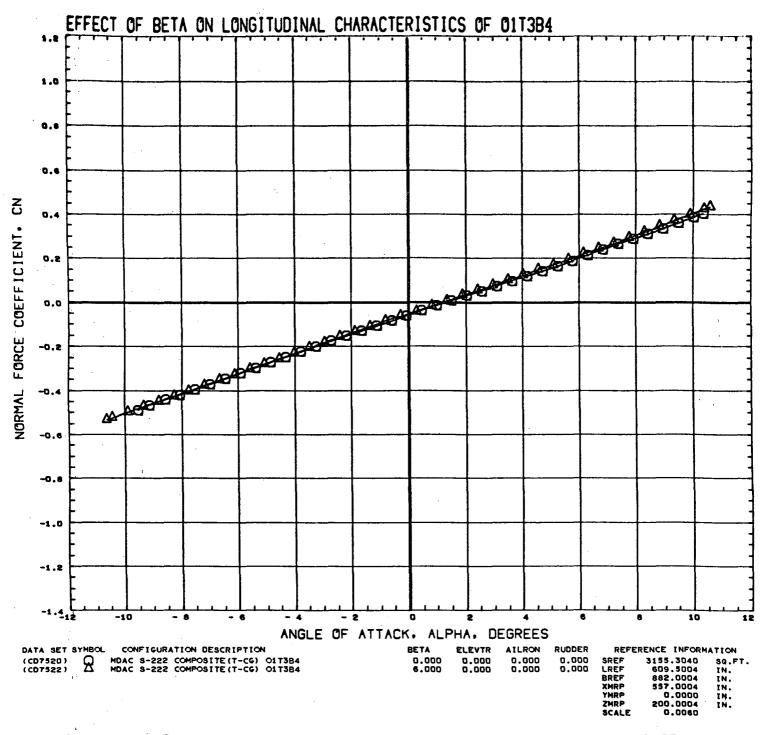




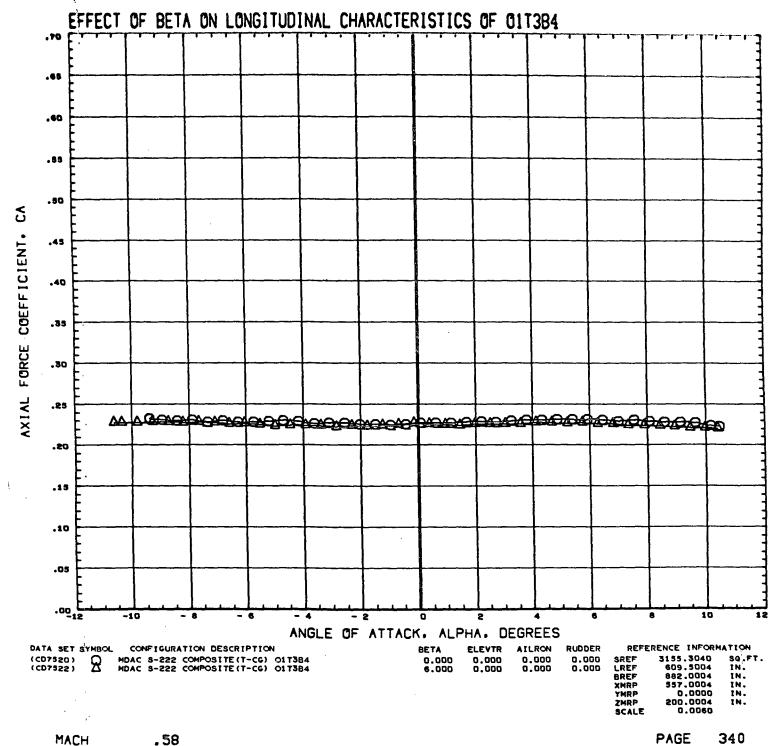


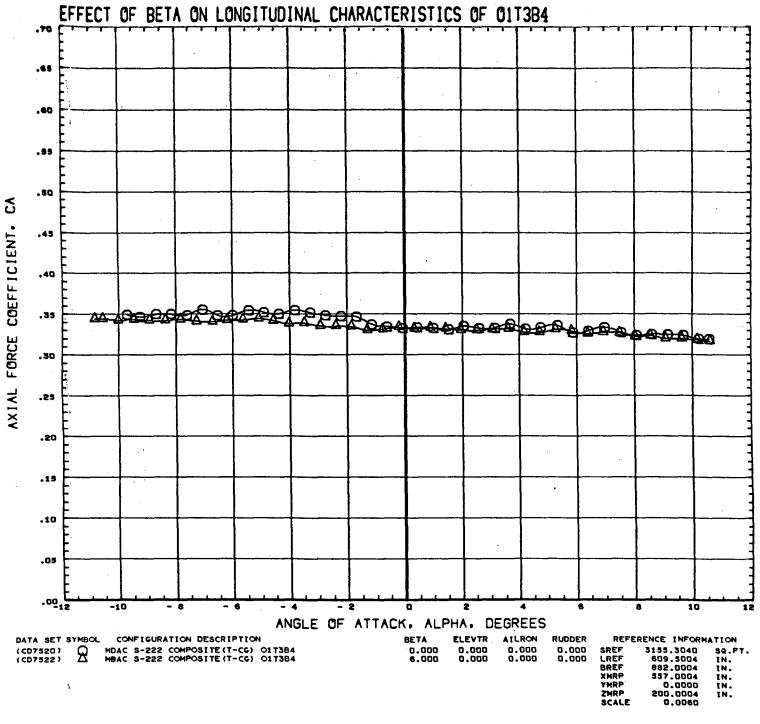


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MACH 4.47



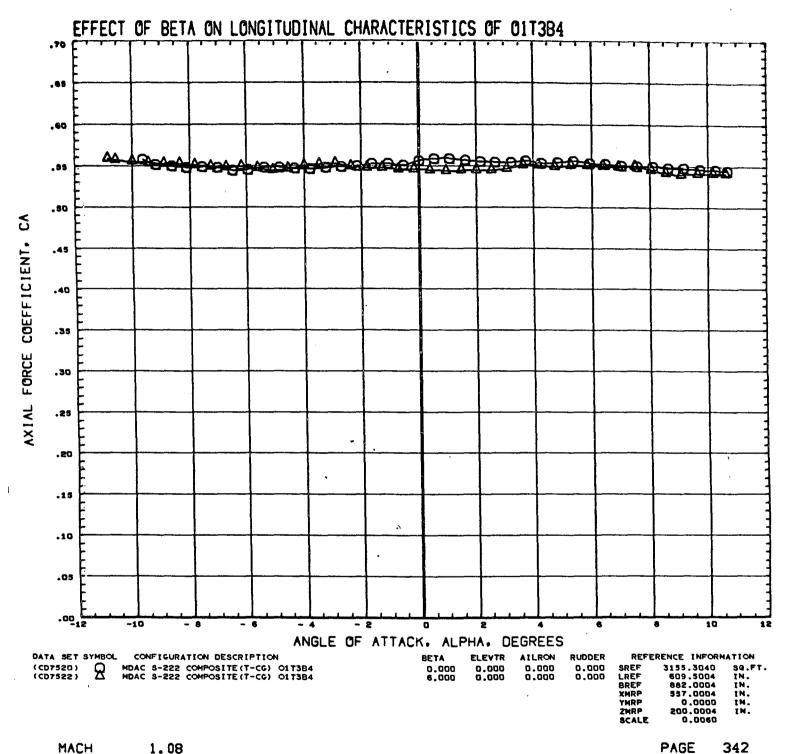


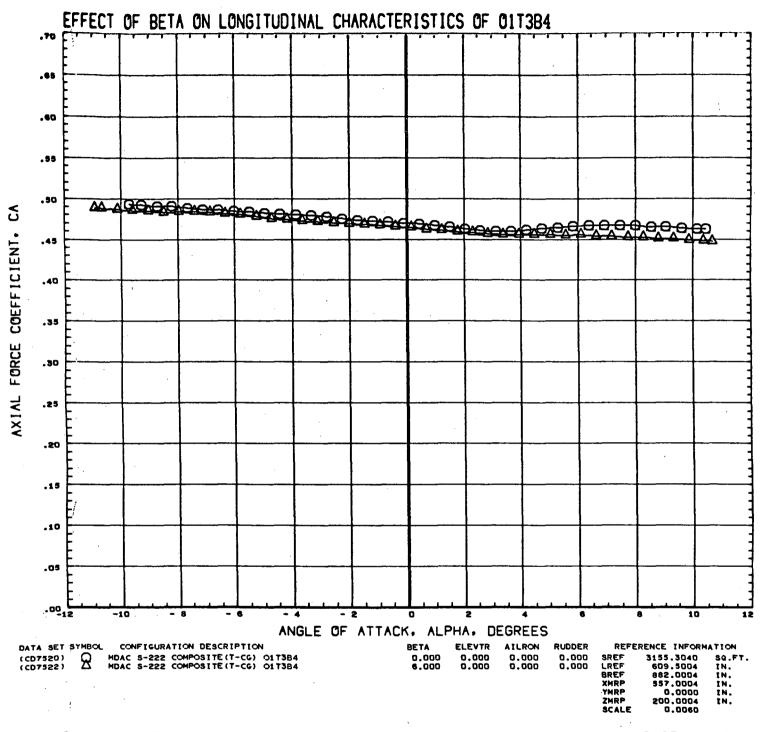
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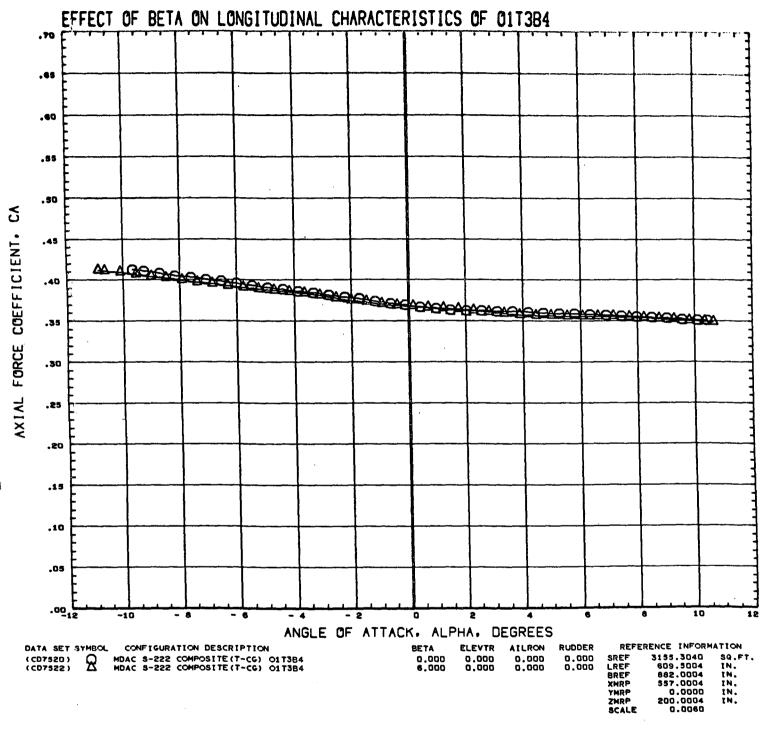
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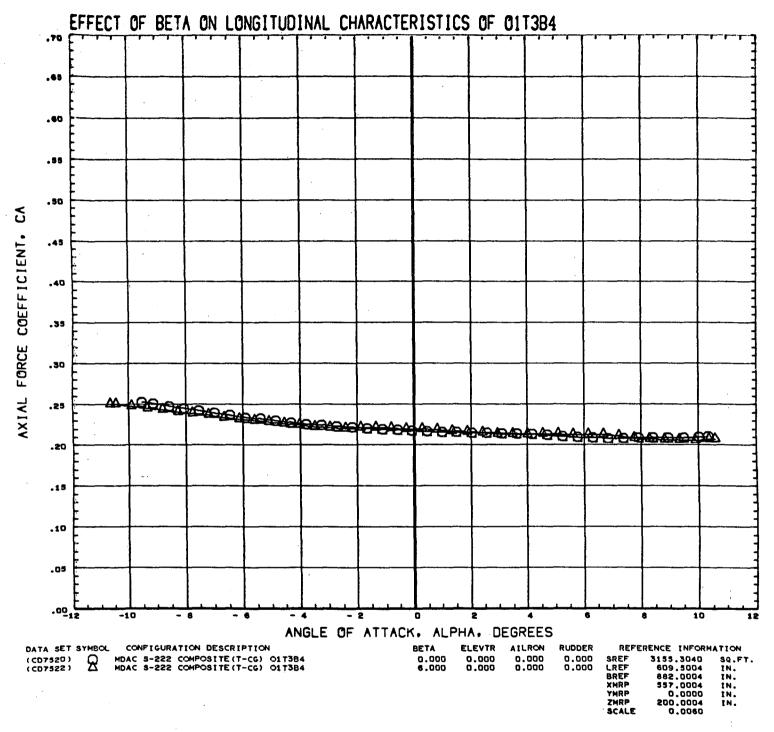
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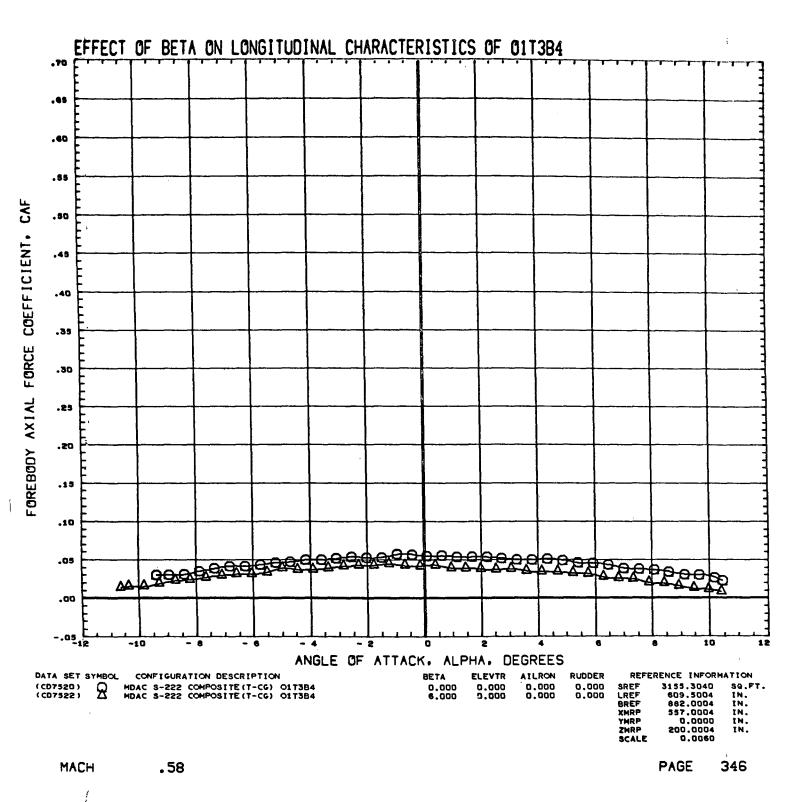


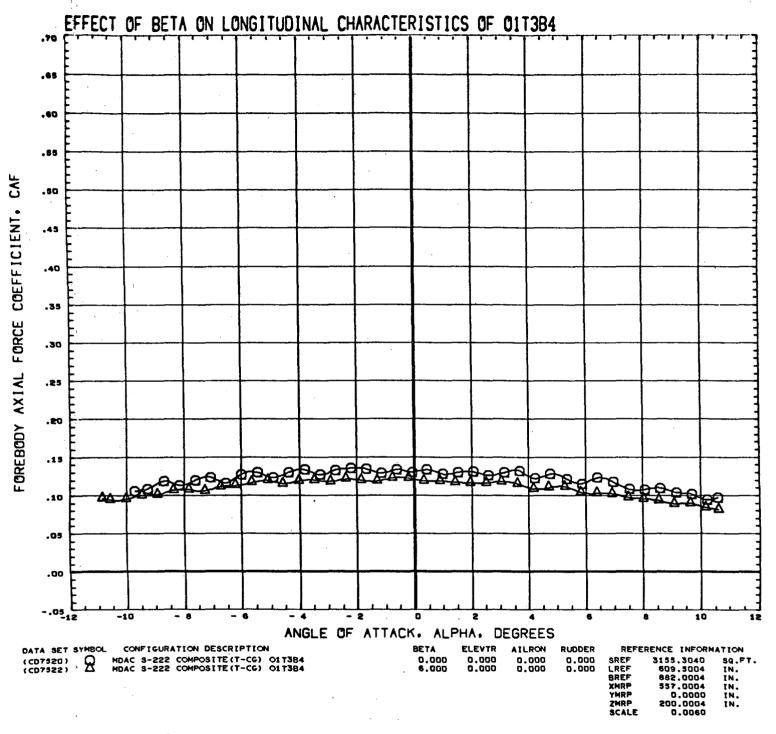


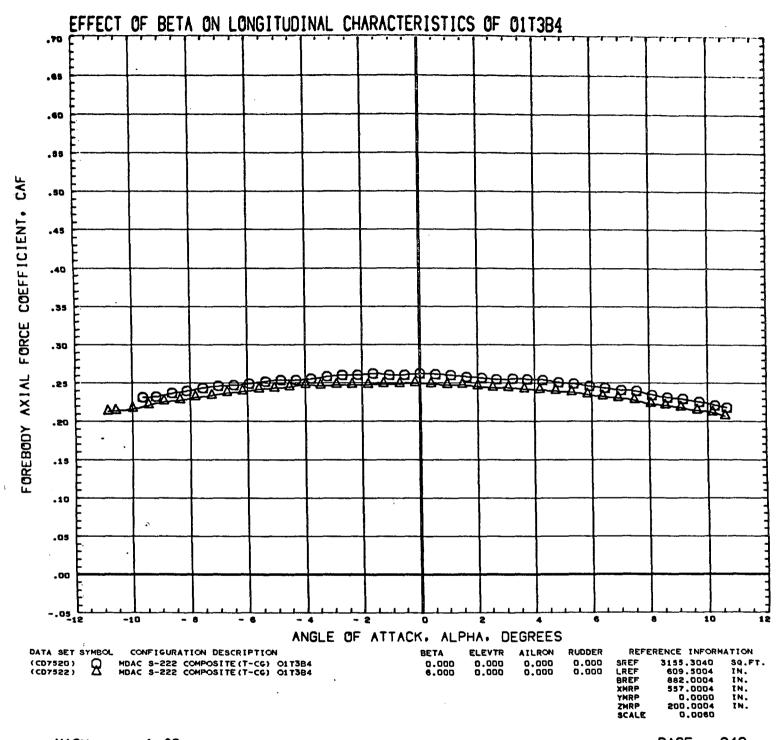
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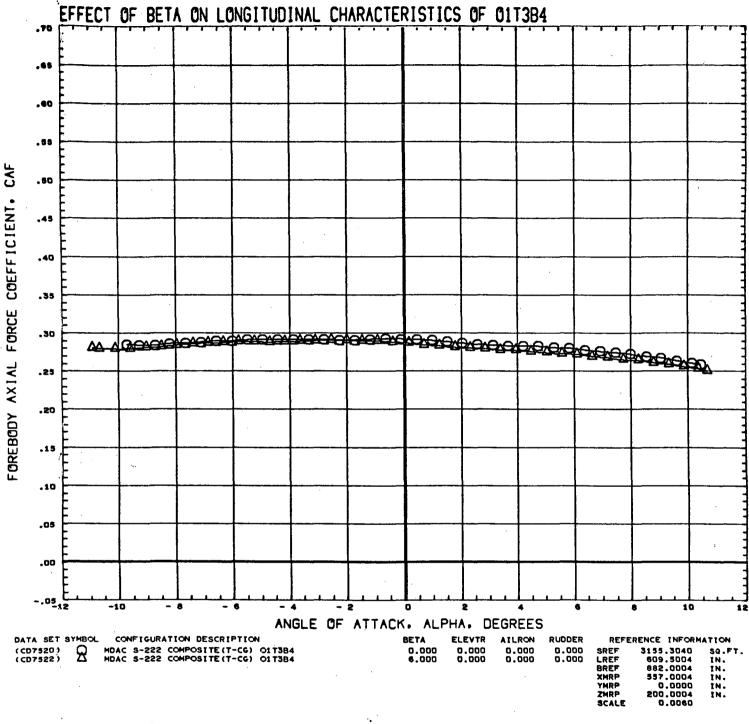


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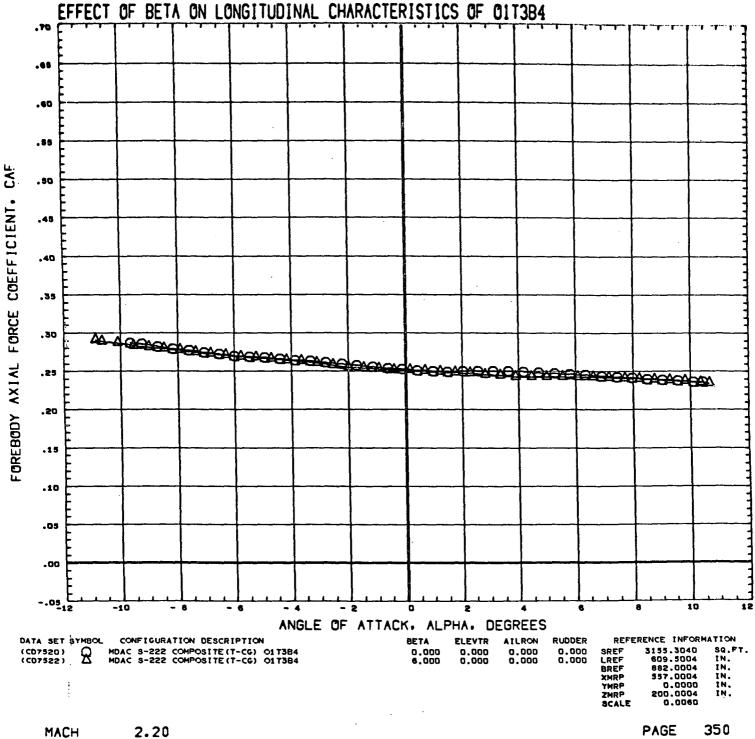




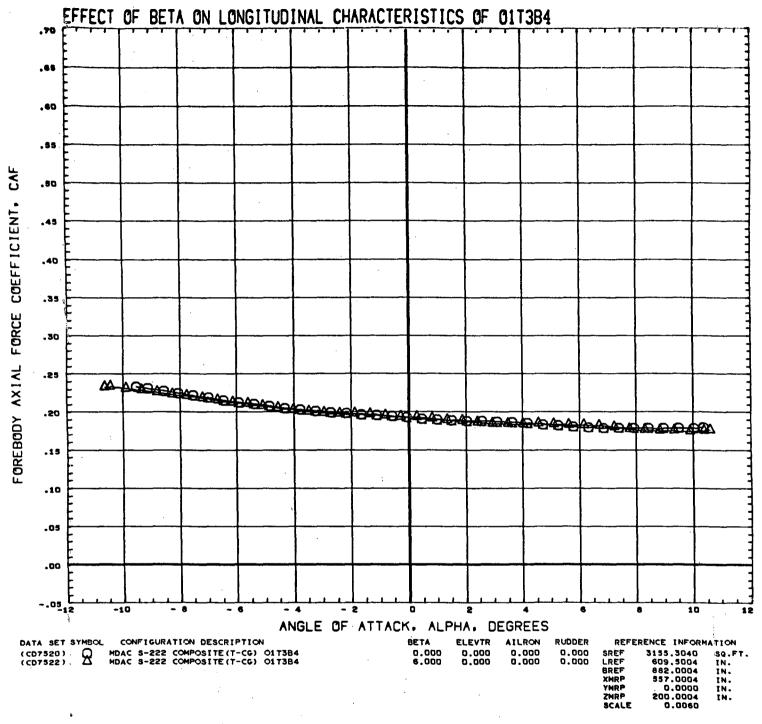


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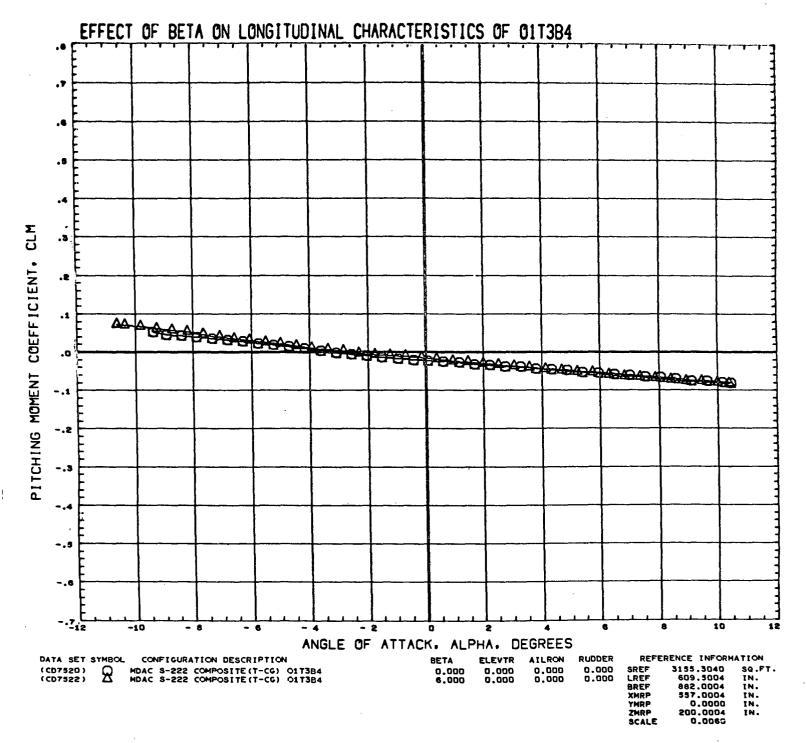
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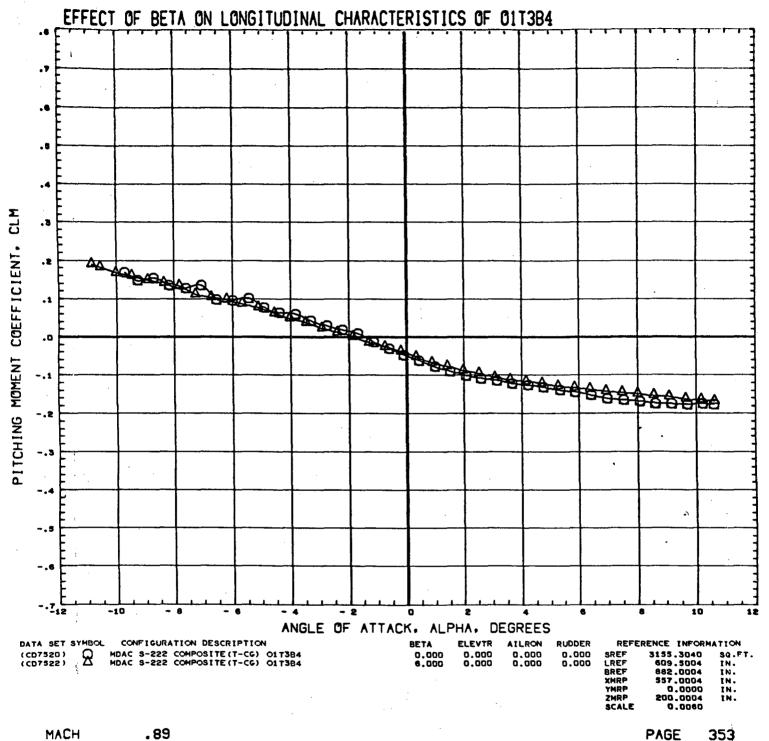


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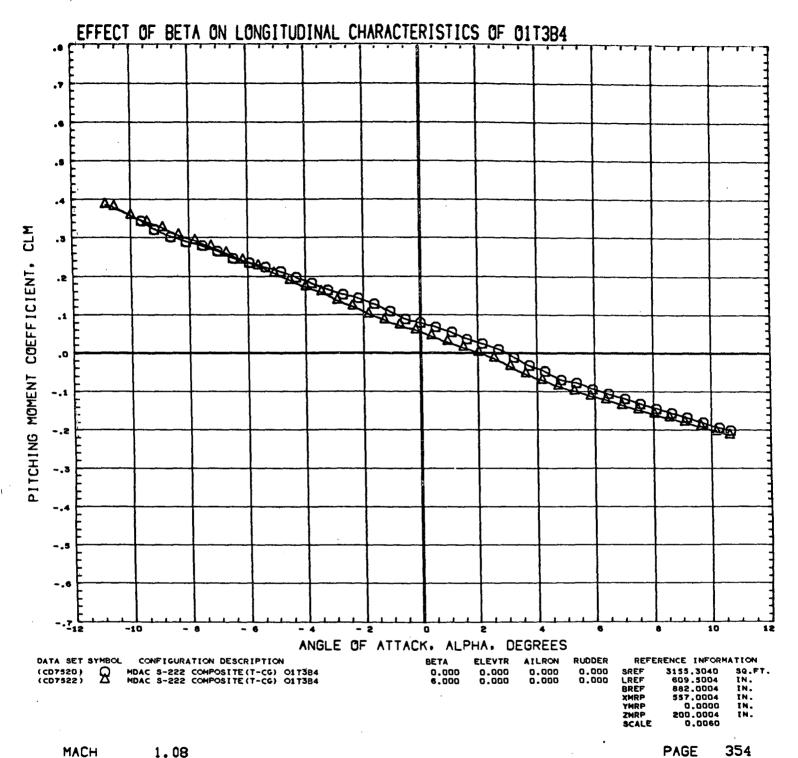
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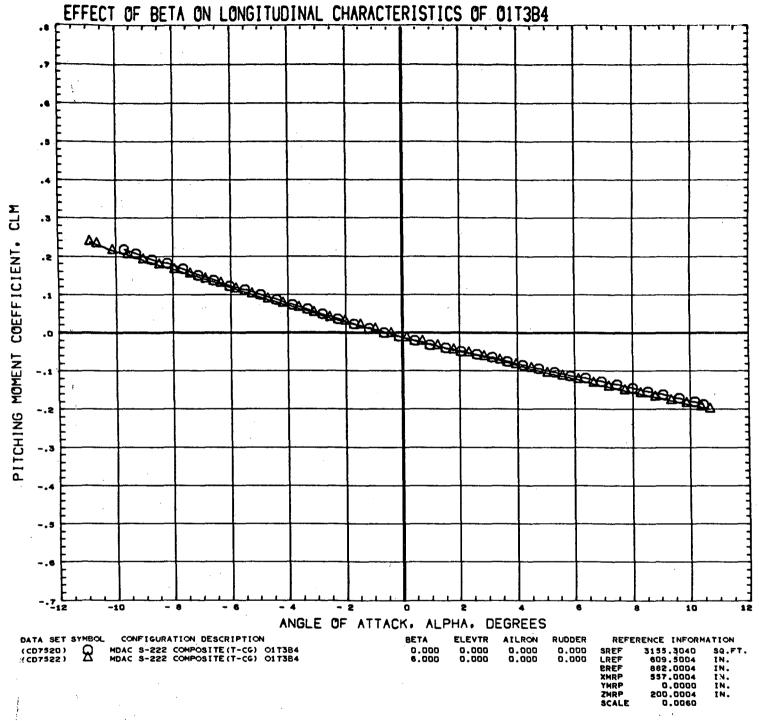
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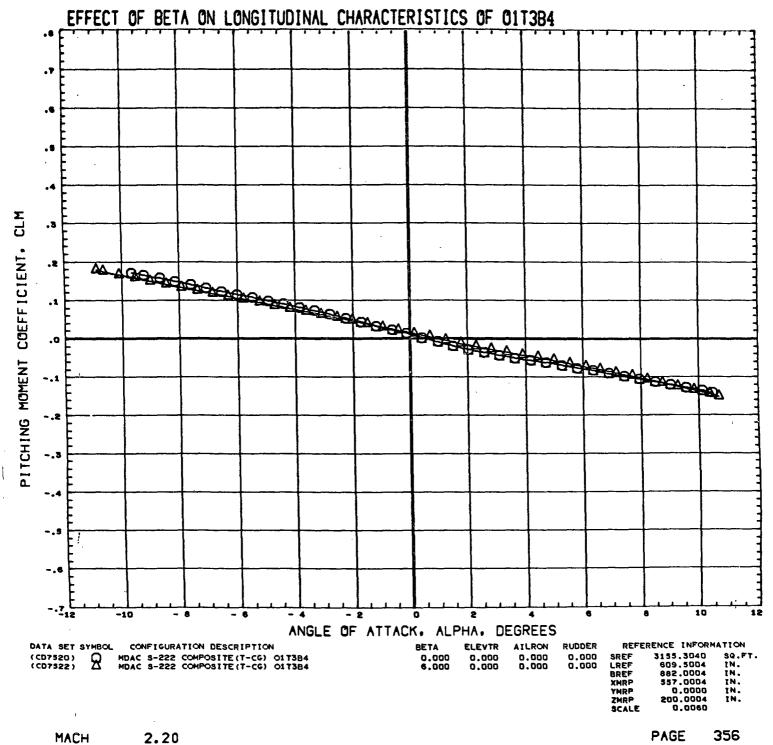
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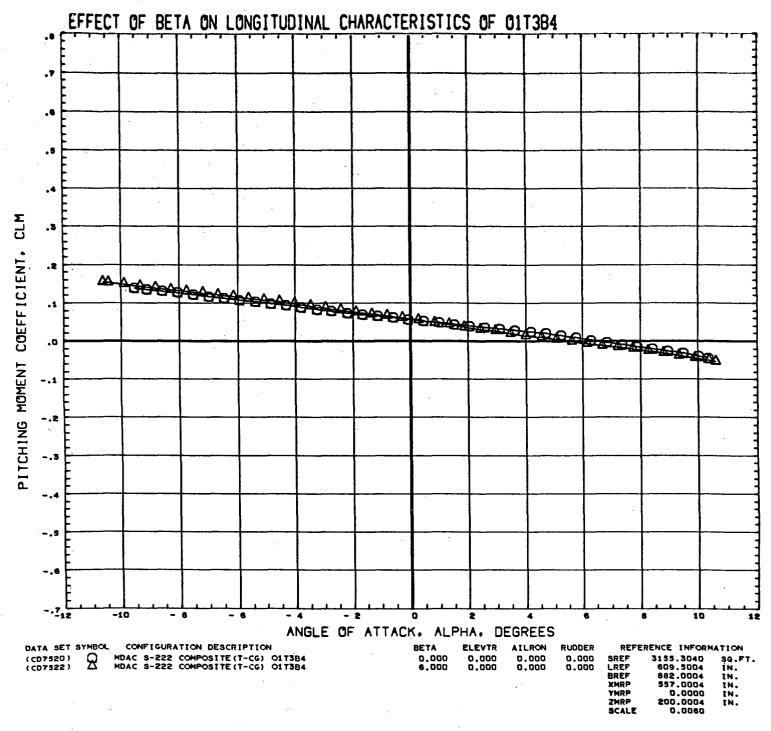




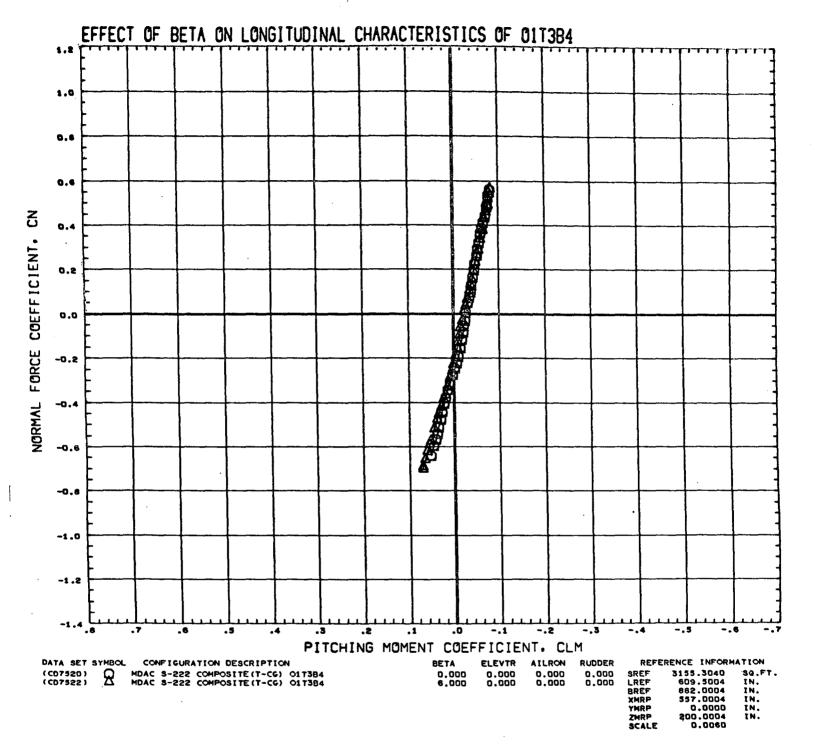
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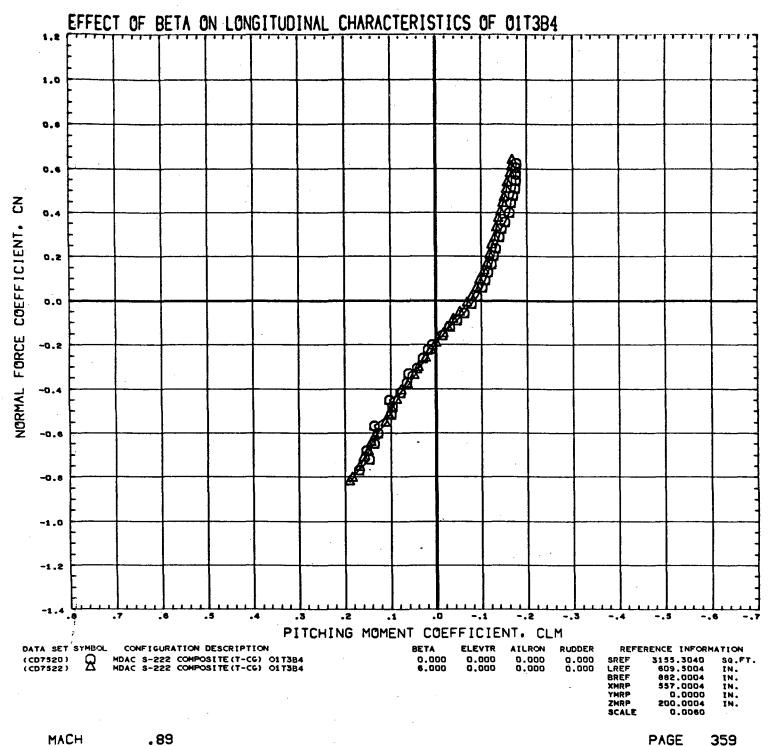
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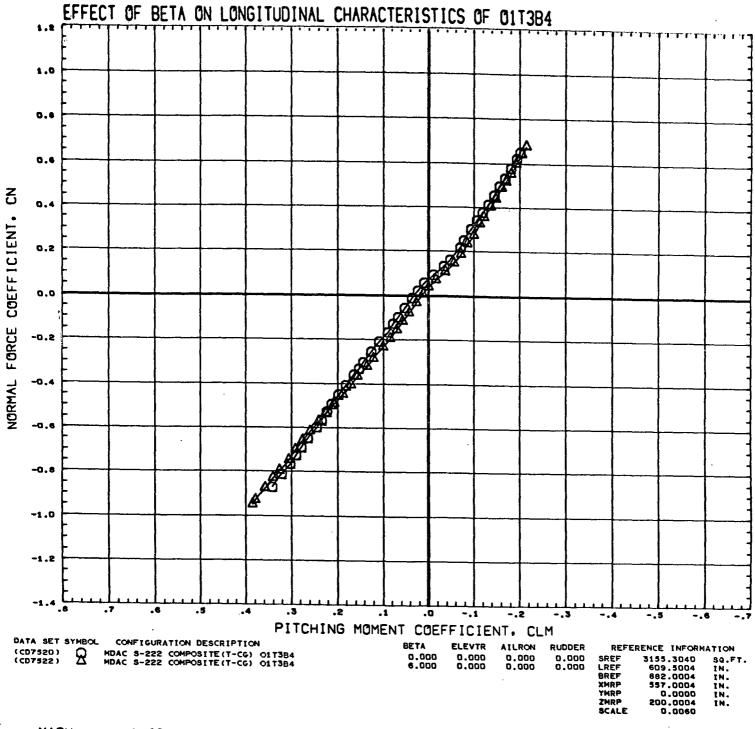




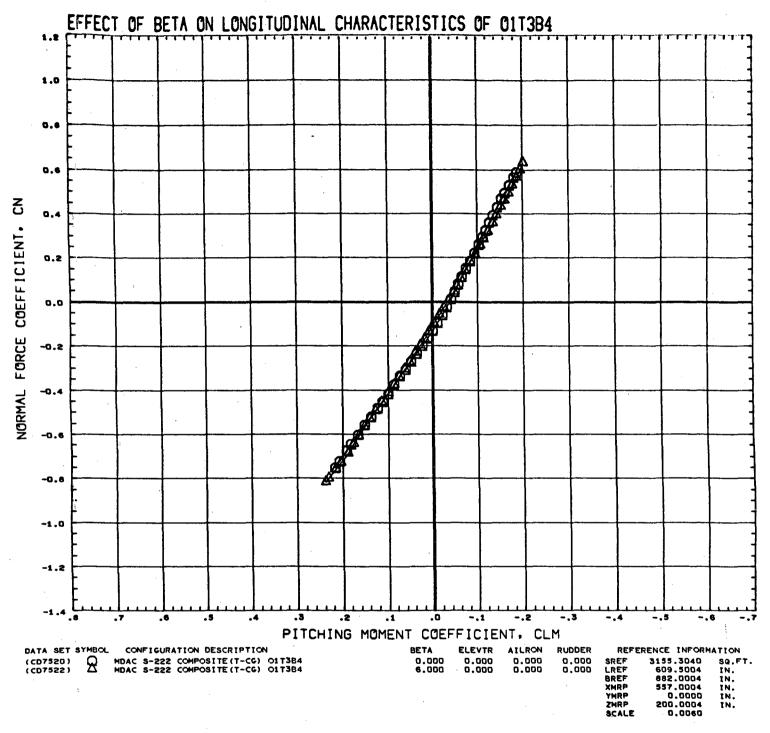
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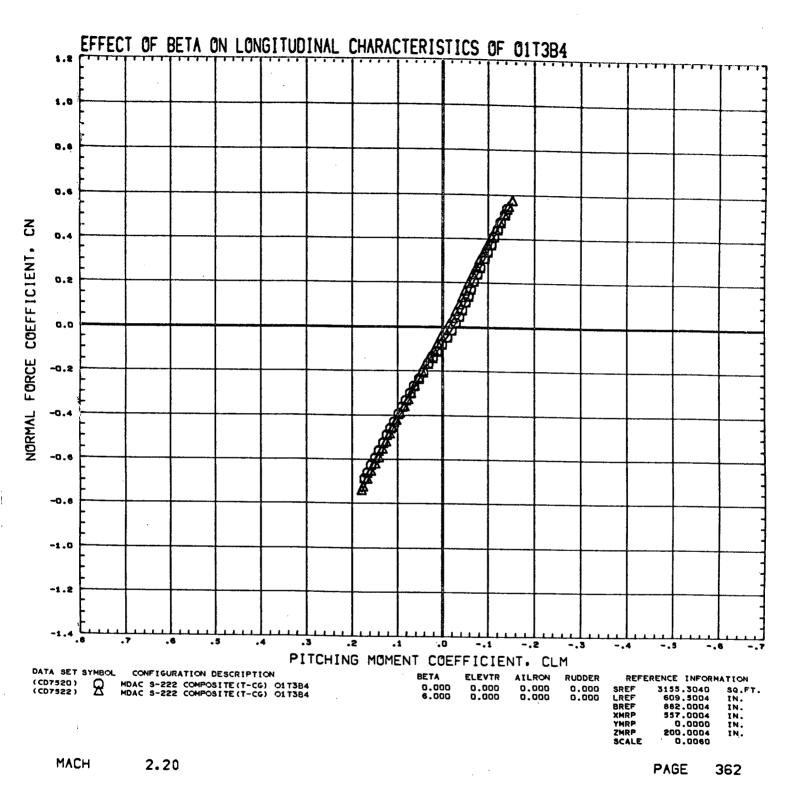


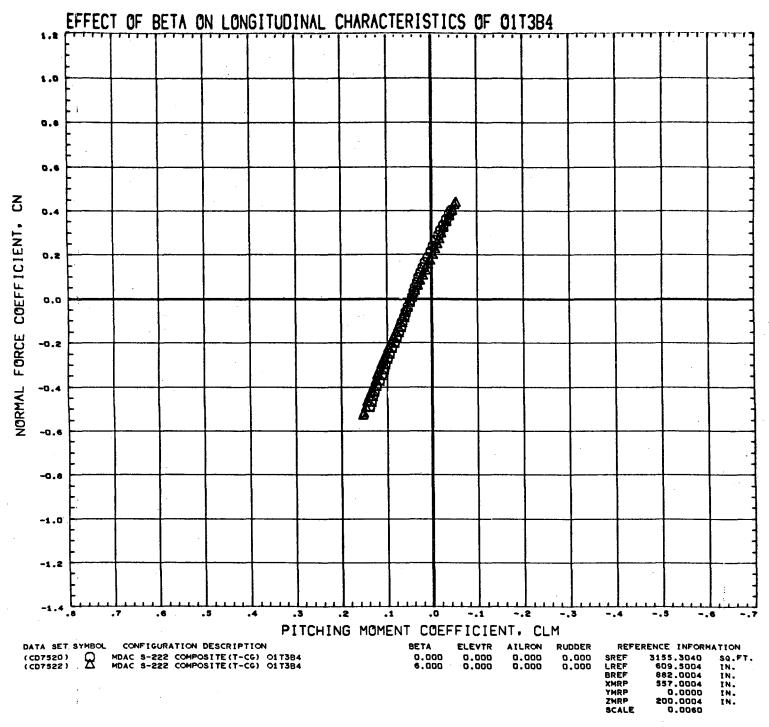


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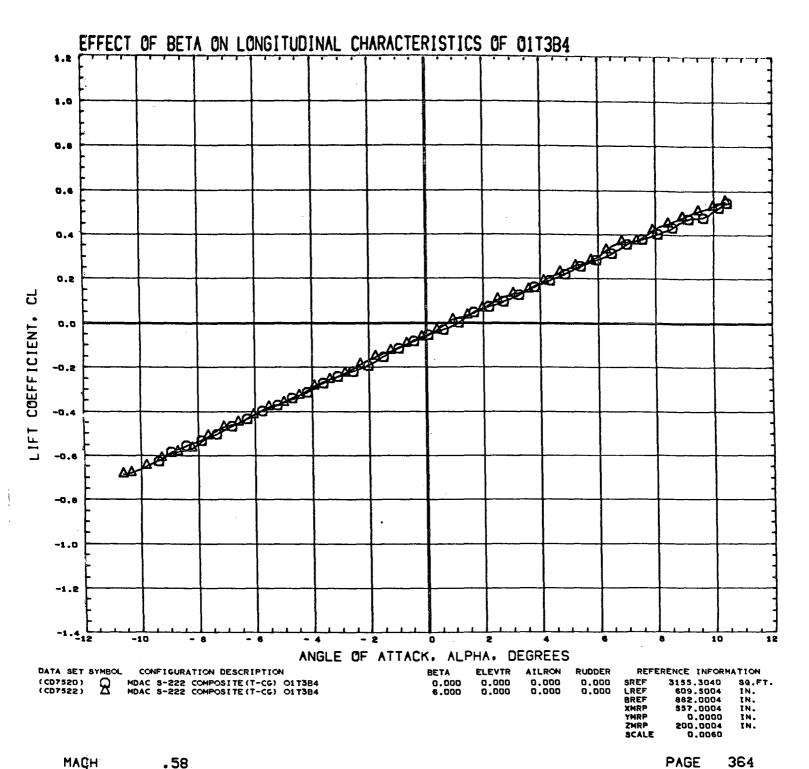


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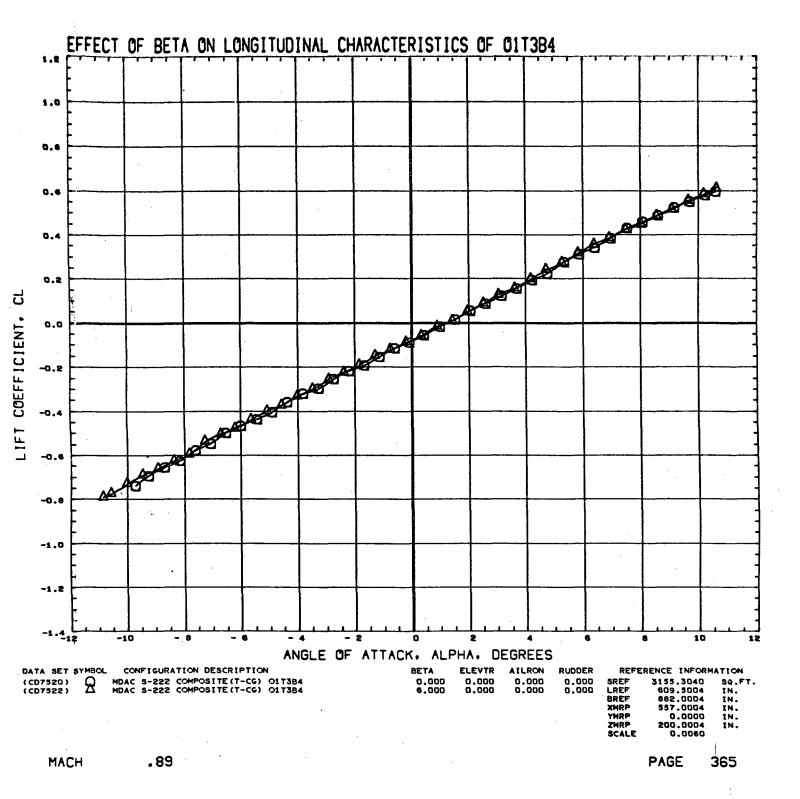


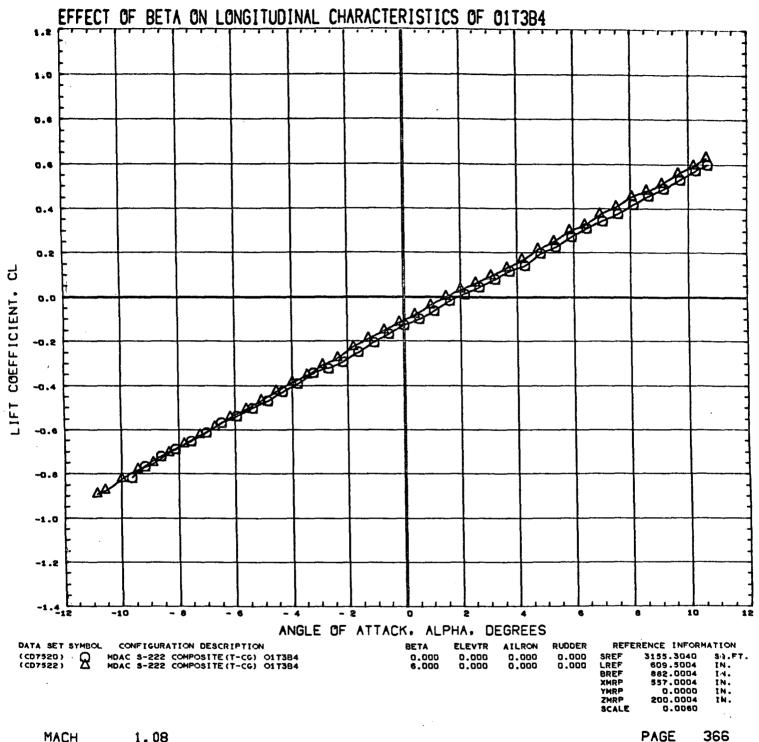


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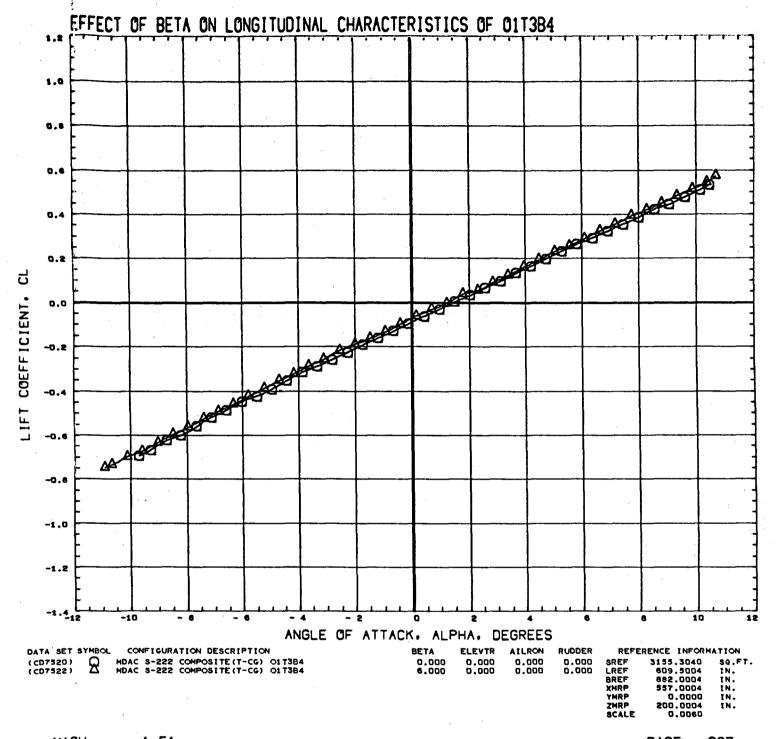


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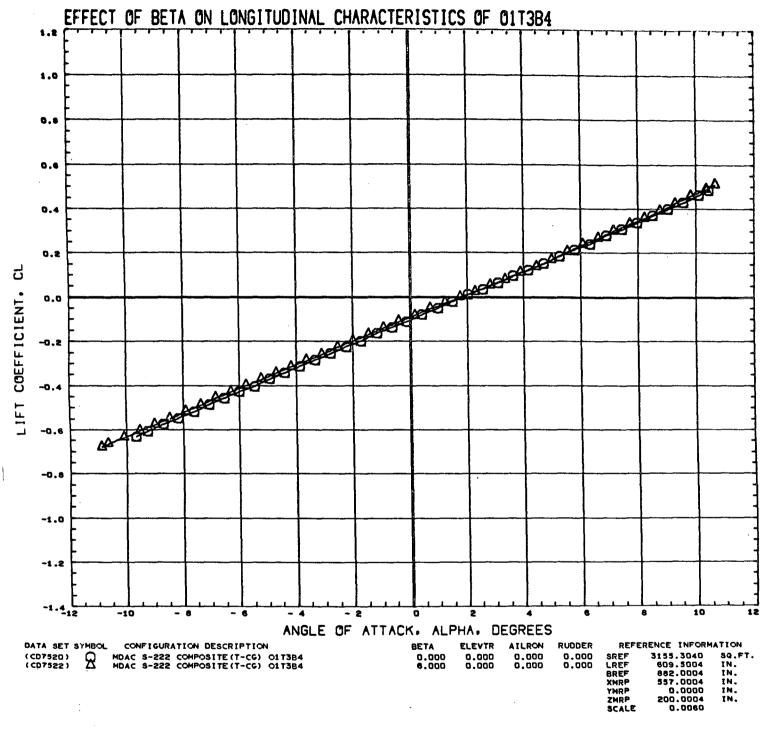




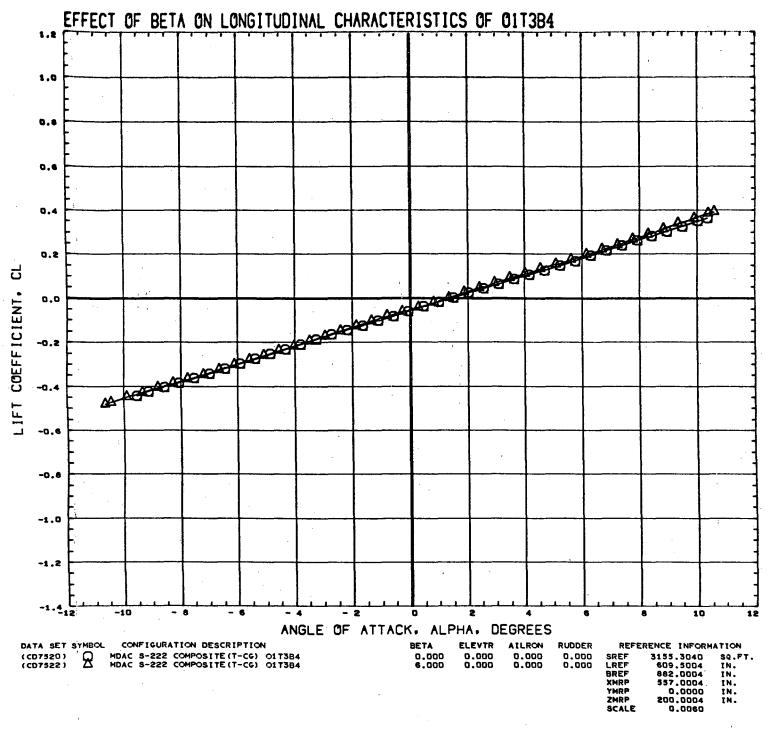
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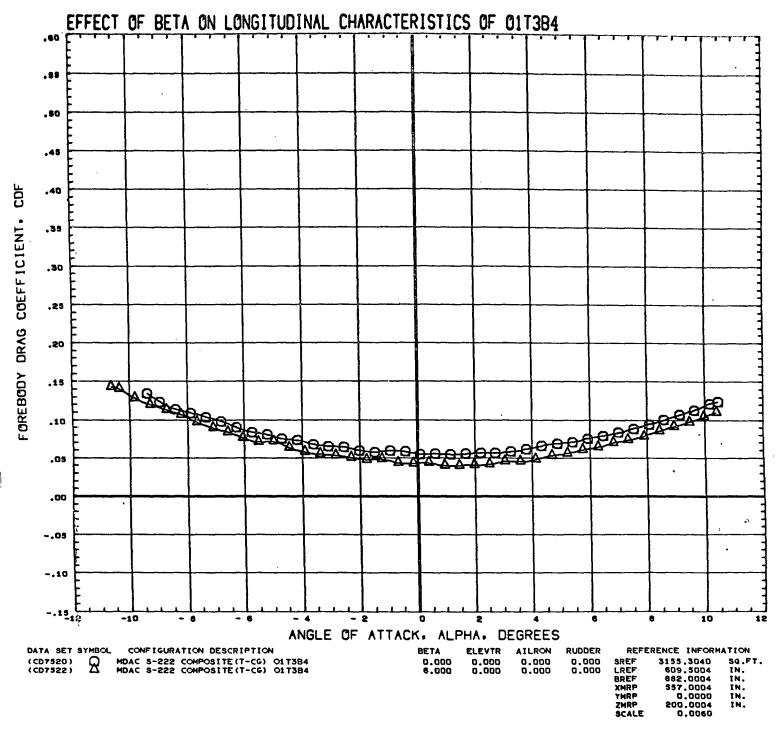
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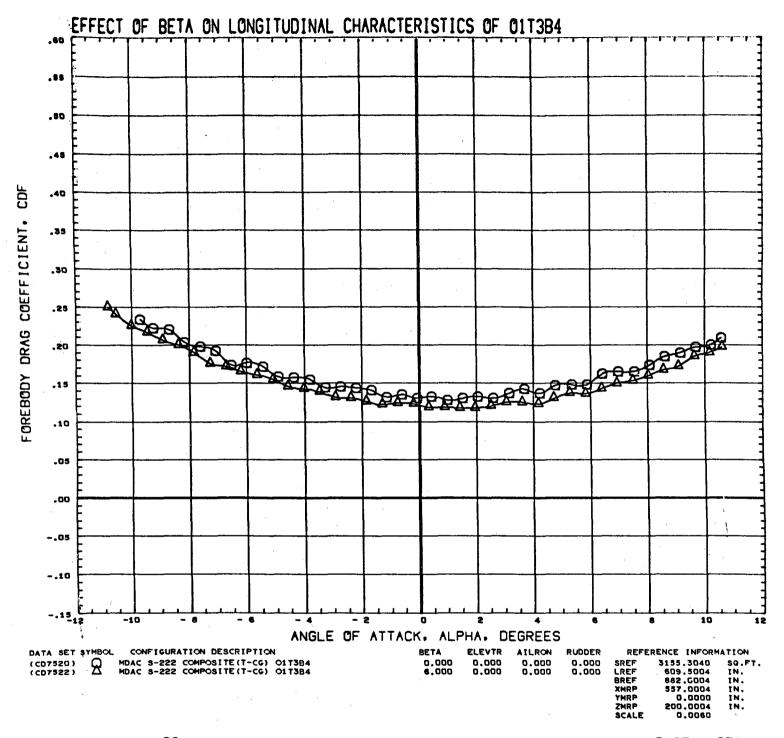
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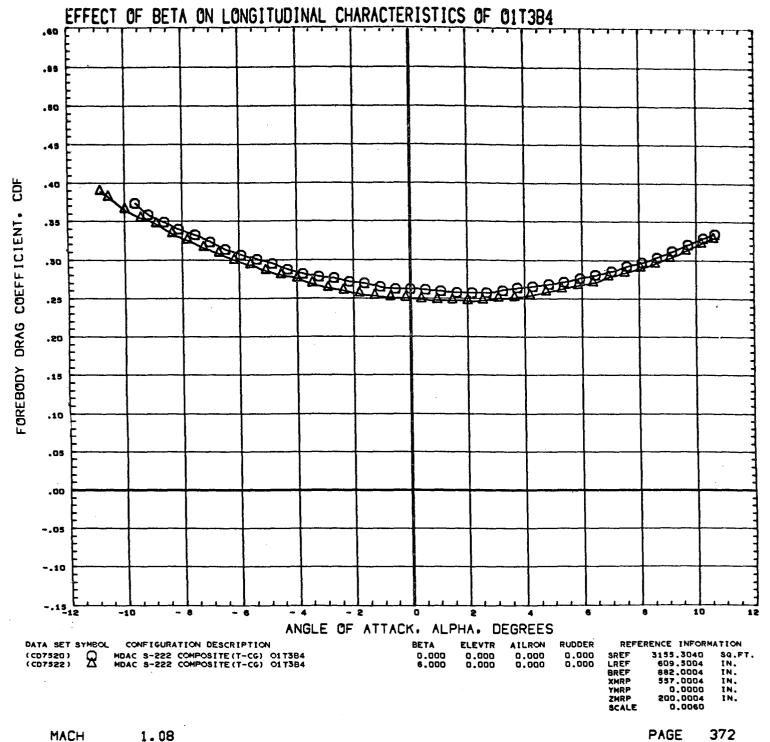
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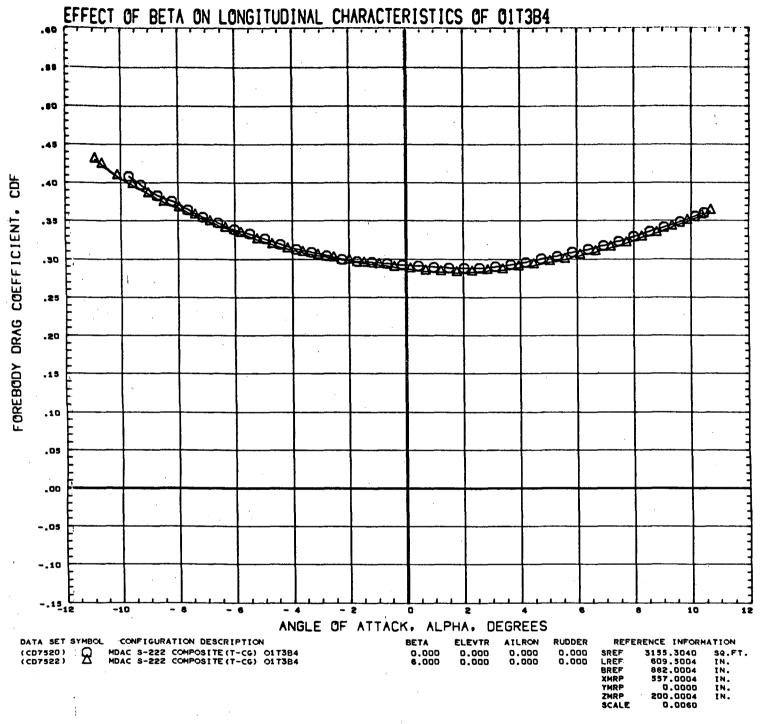


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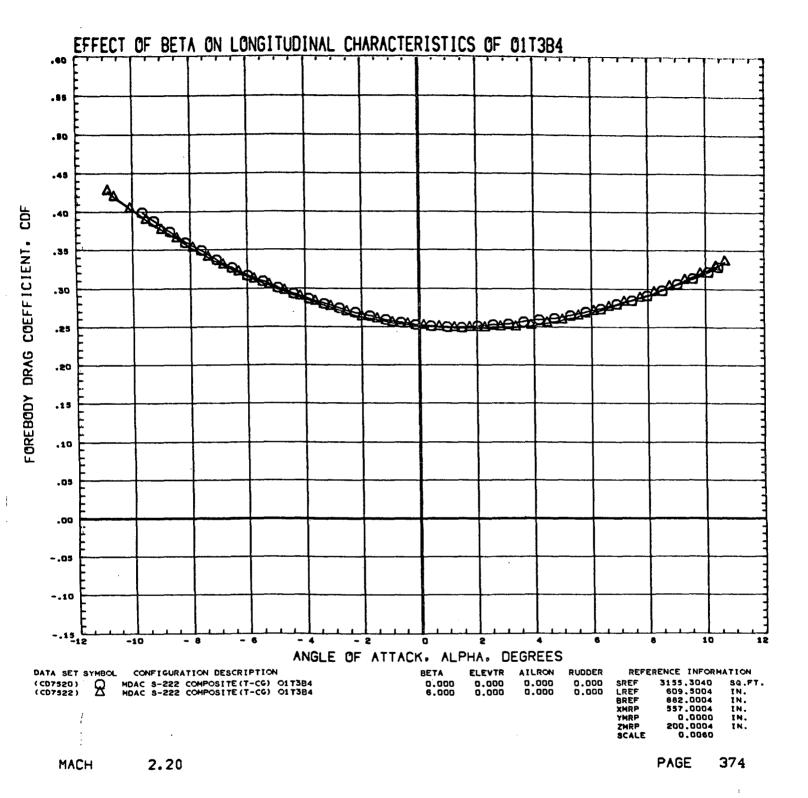


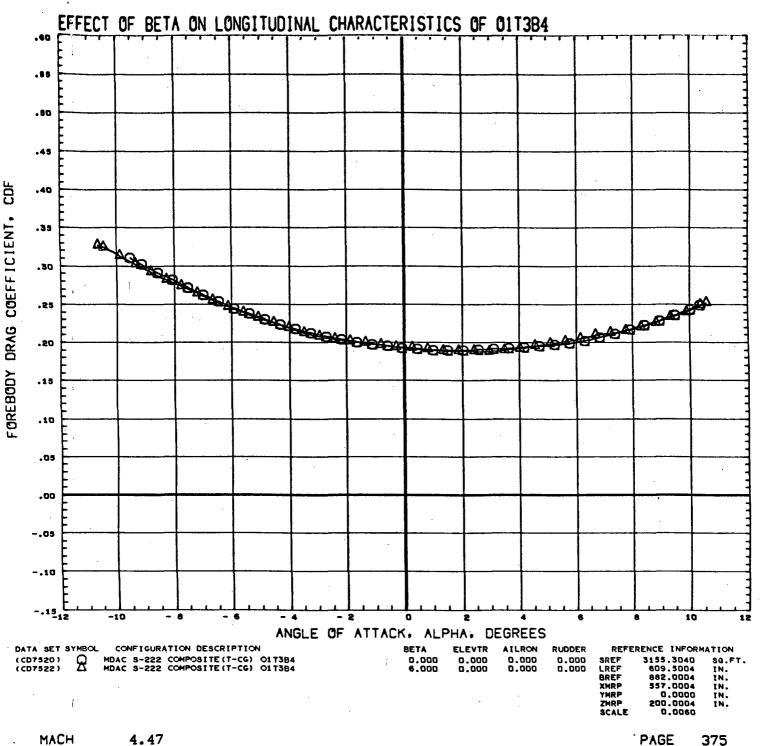
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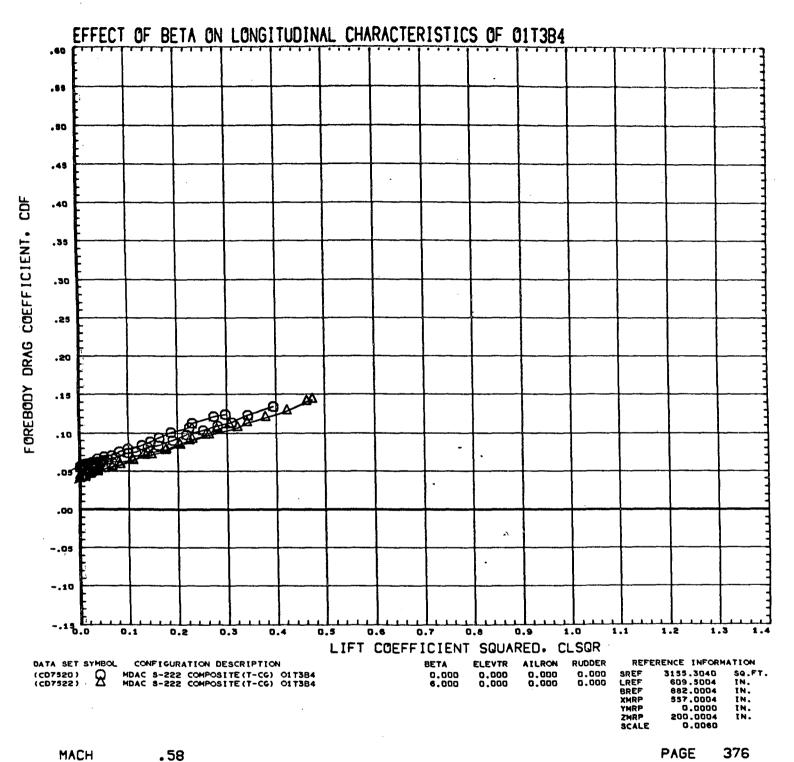


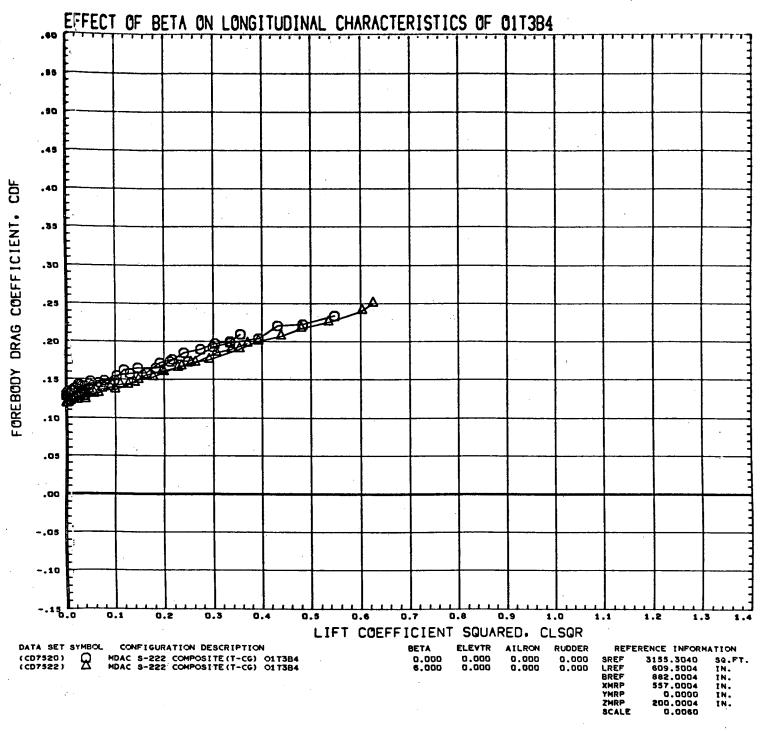
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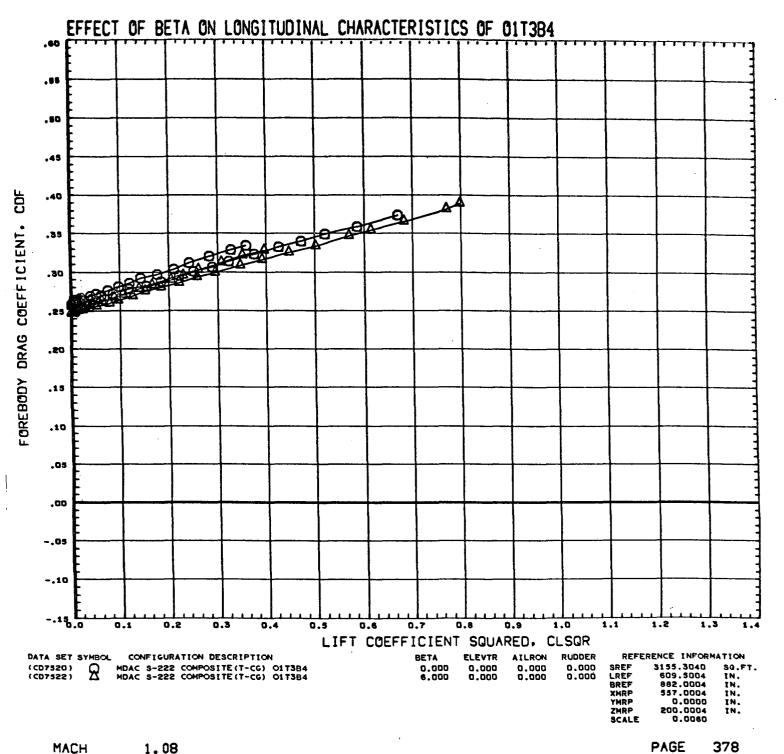


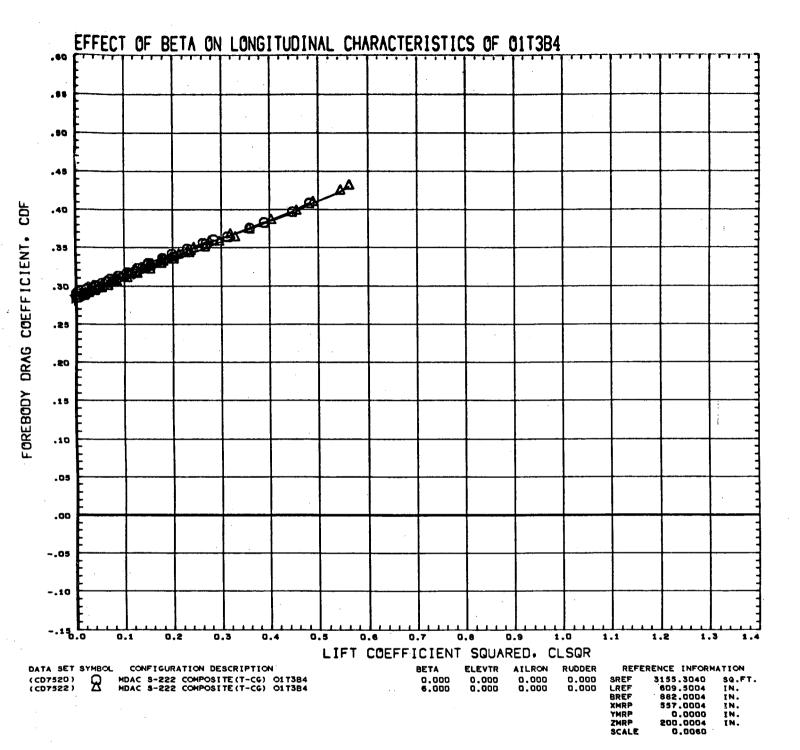
4.47 MACH



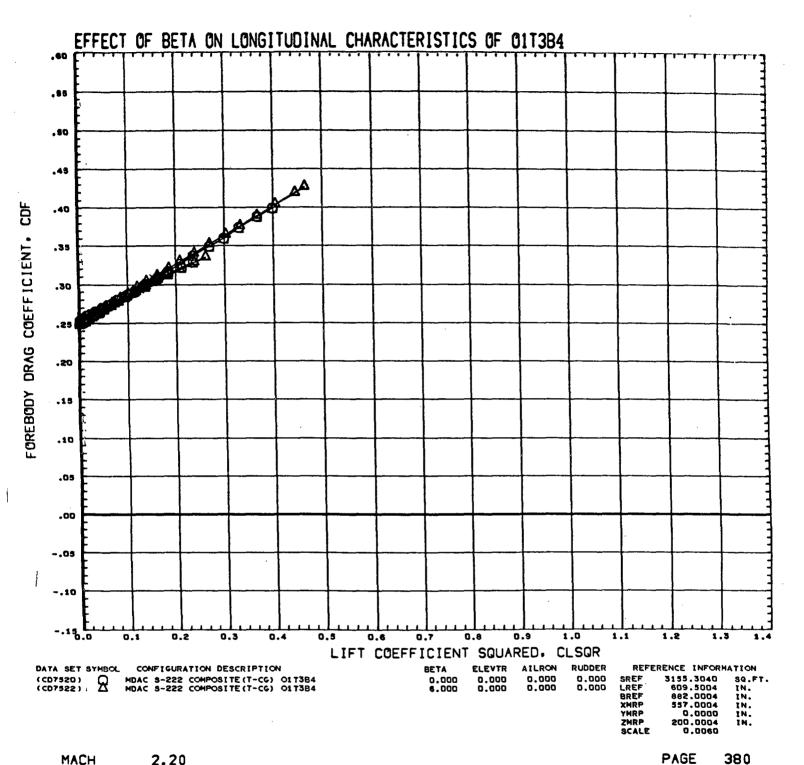


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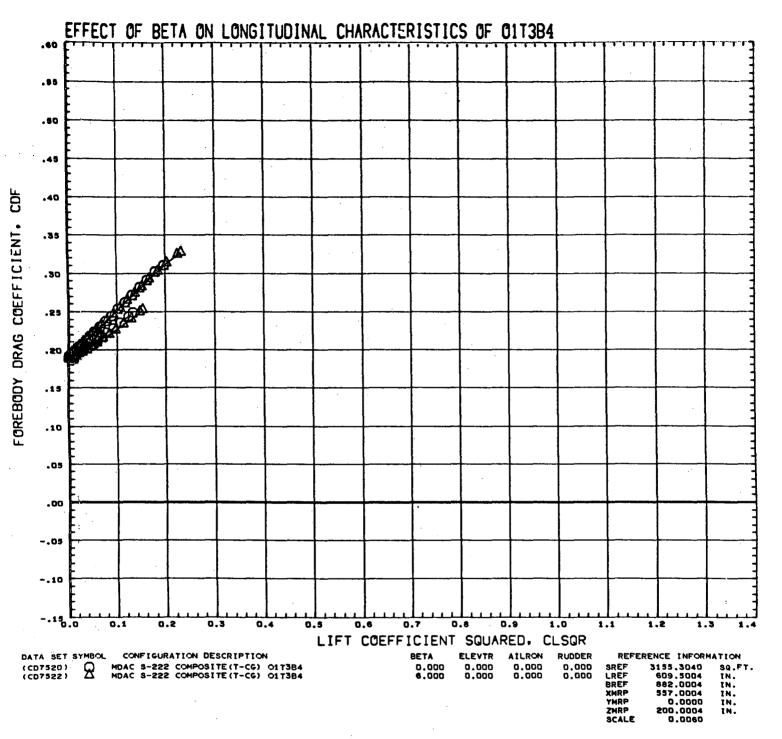




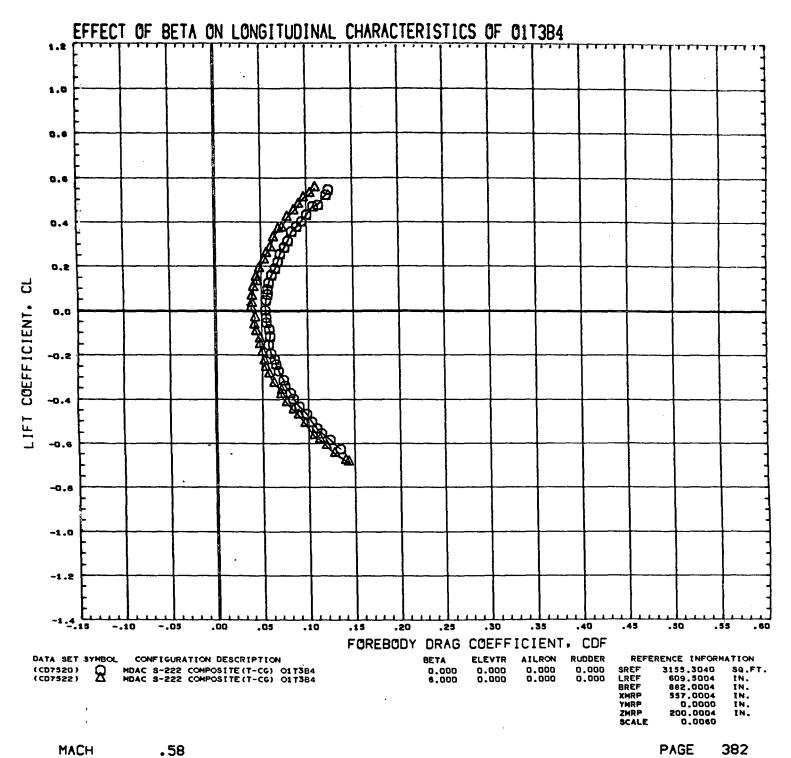
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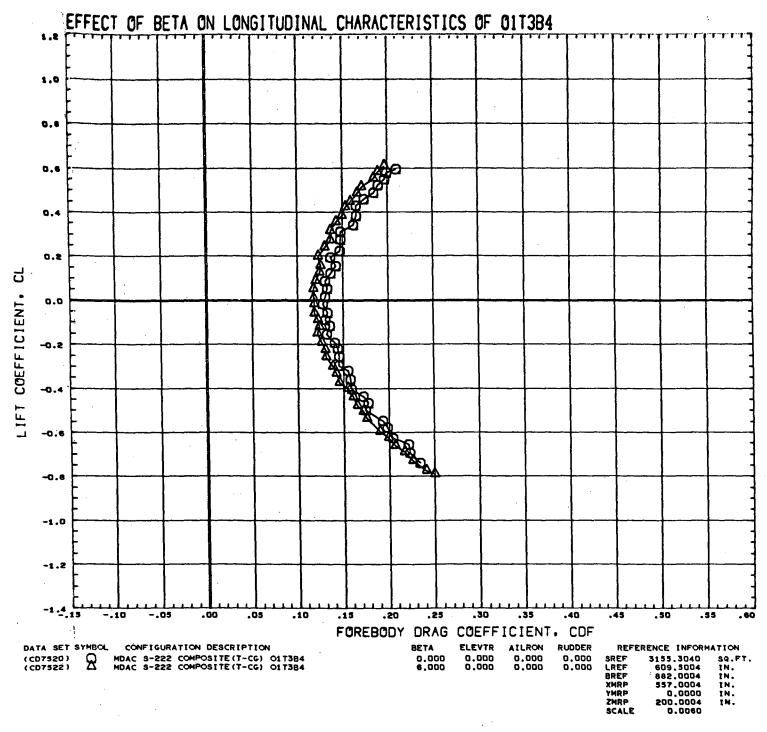


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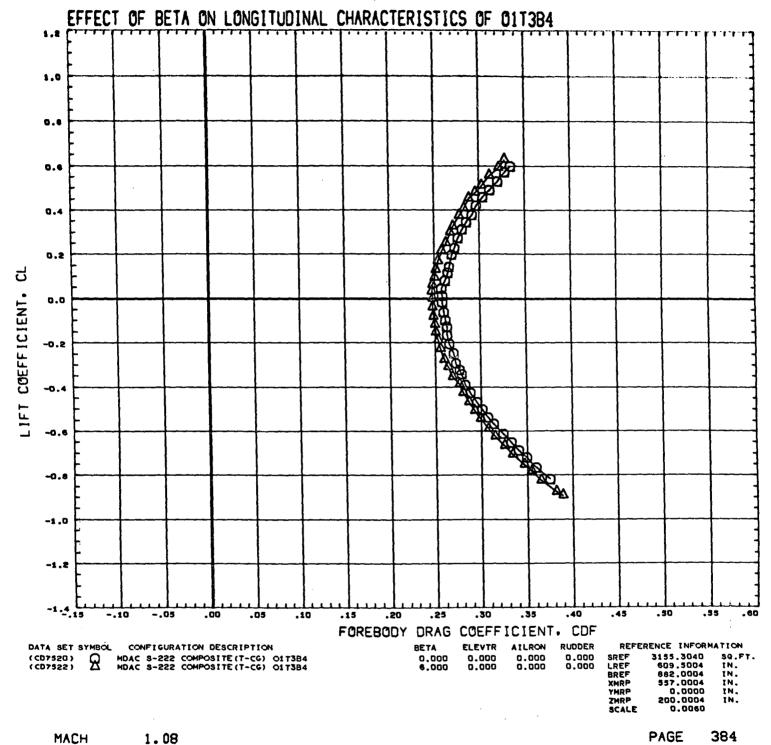


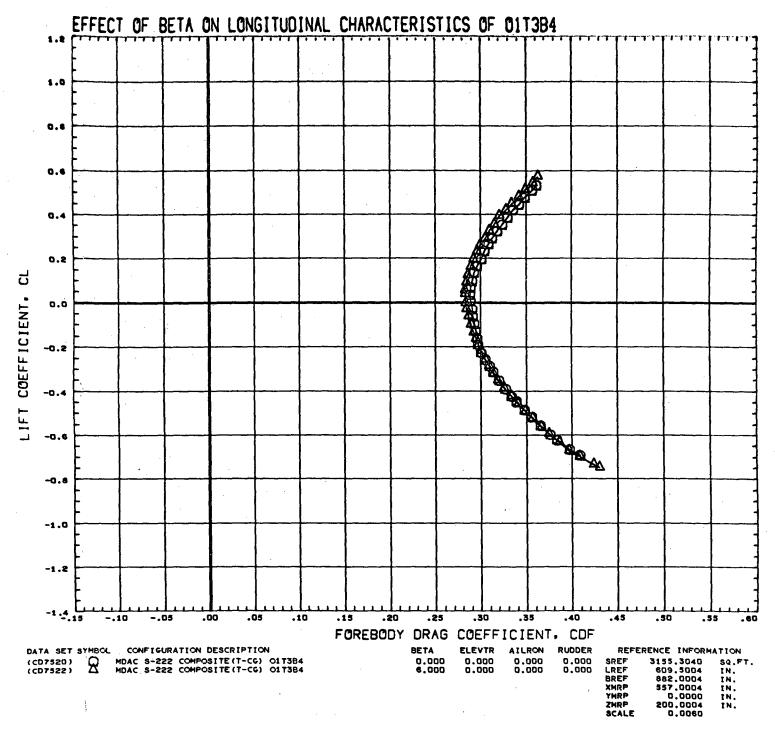
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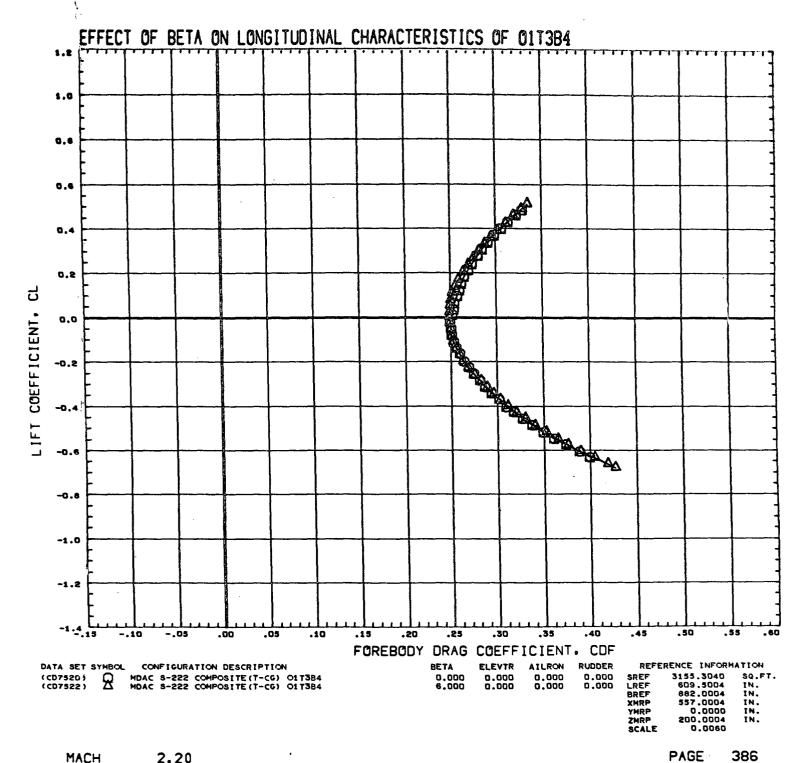


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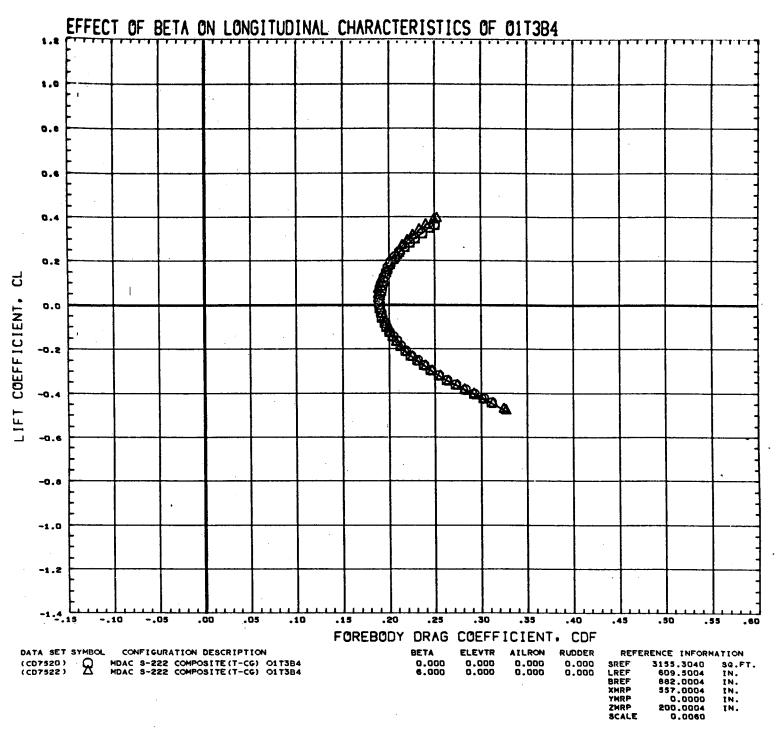




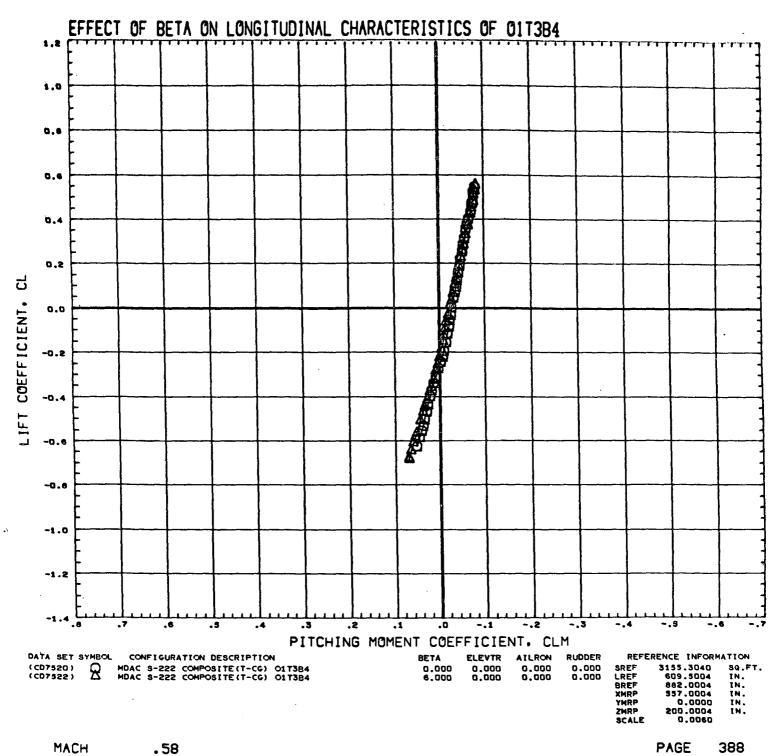
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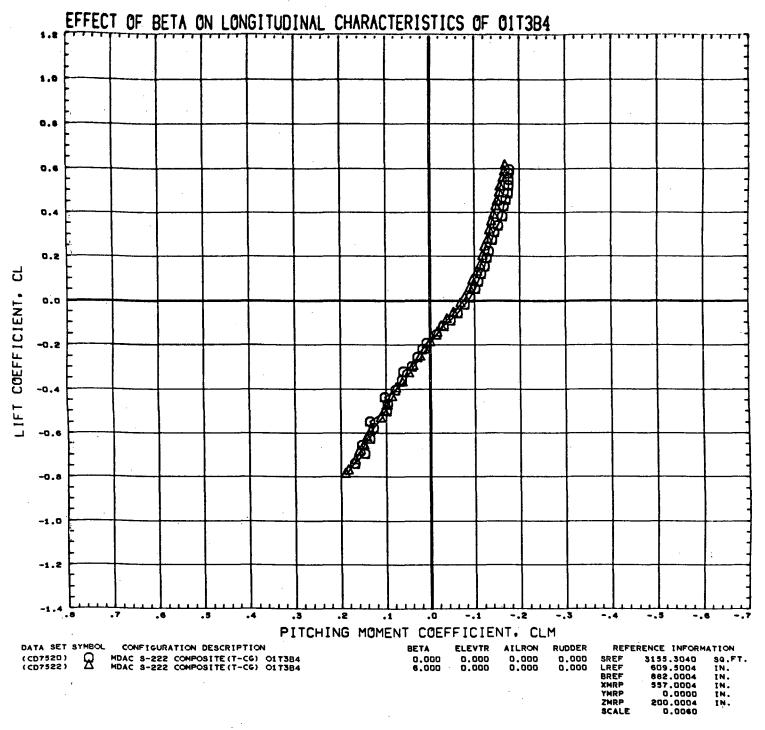


2.20 MACH



MACH 4.47

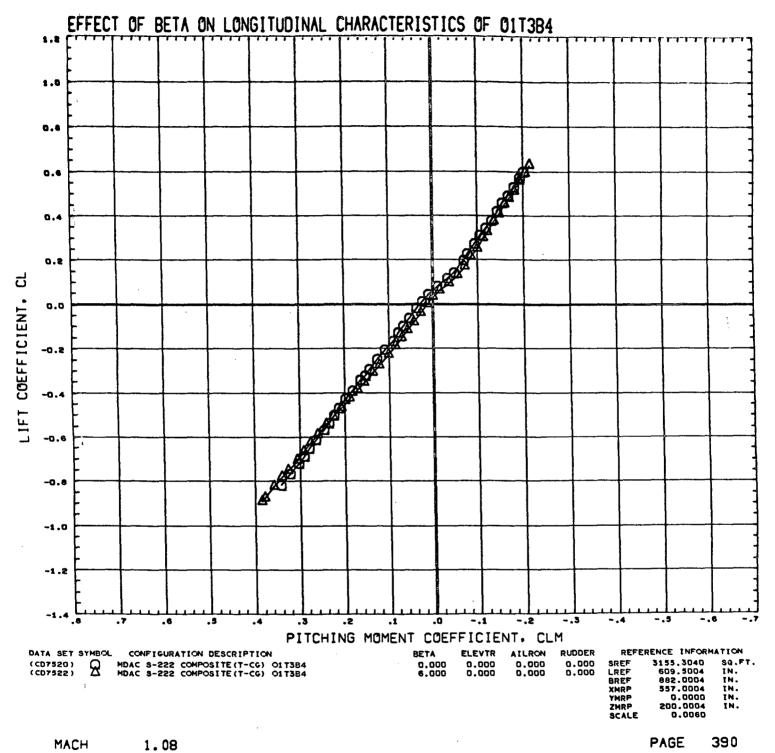


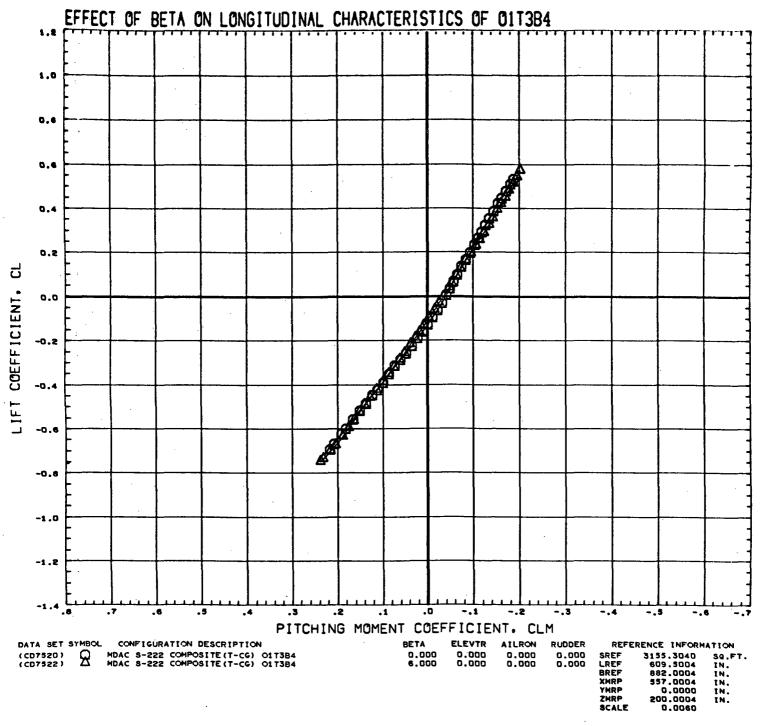


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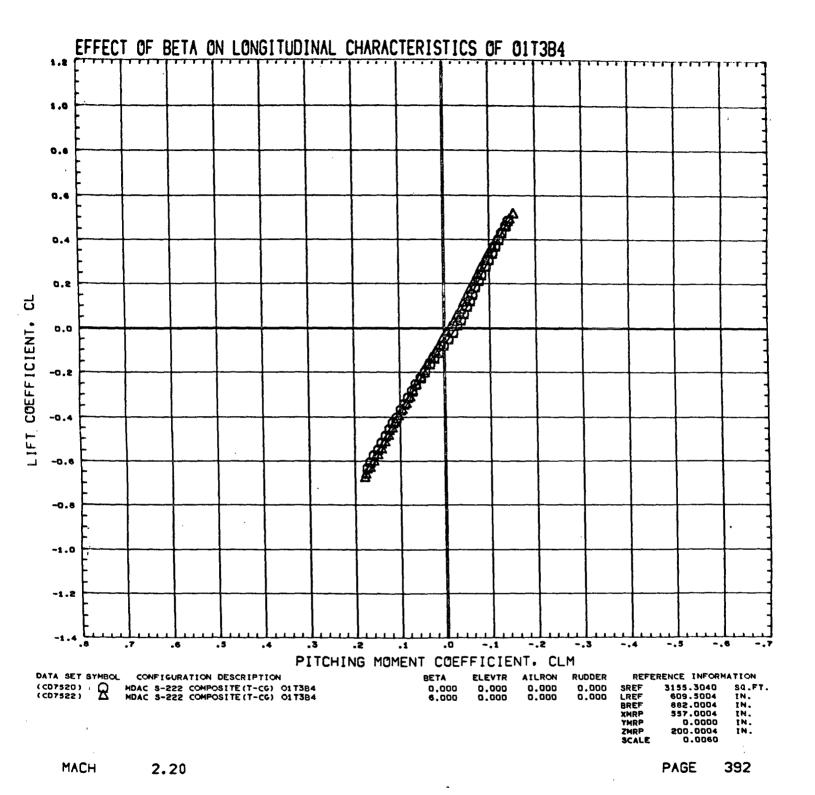
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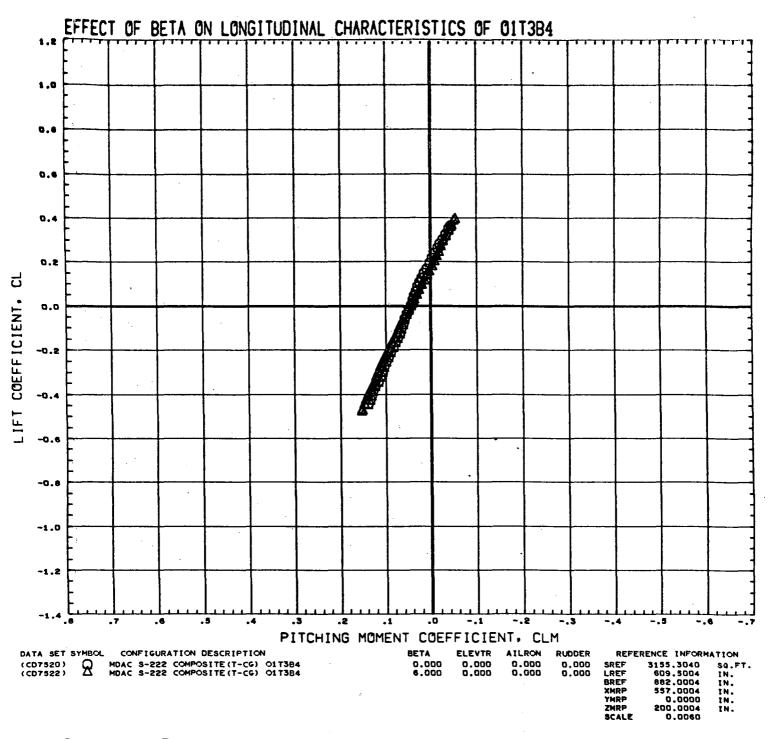
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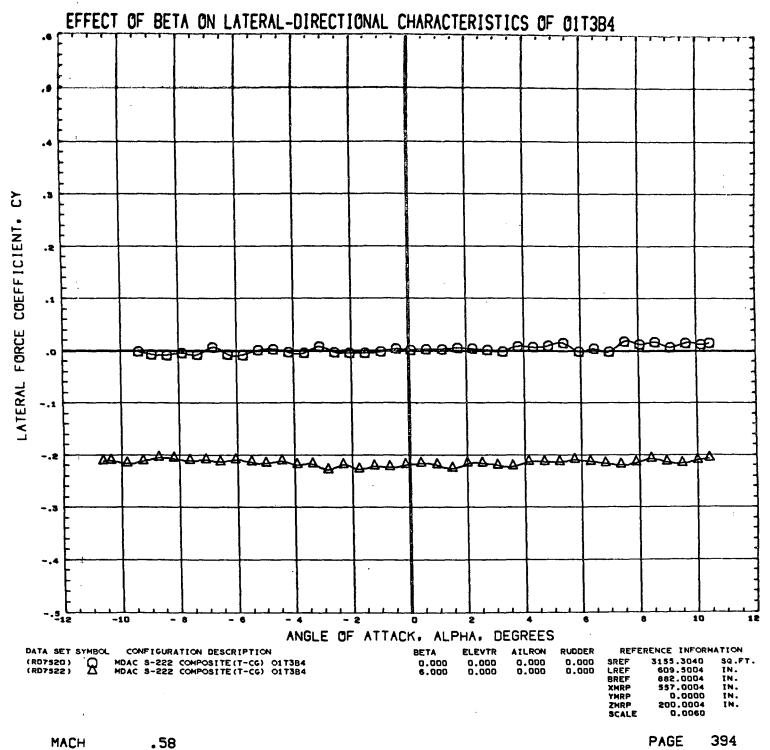


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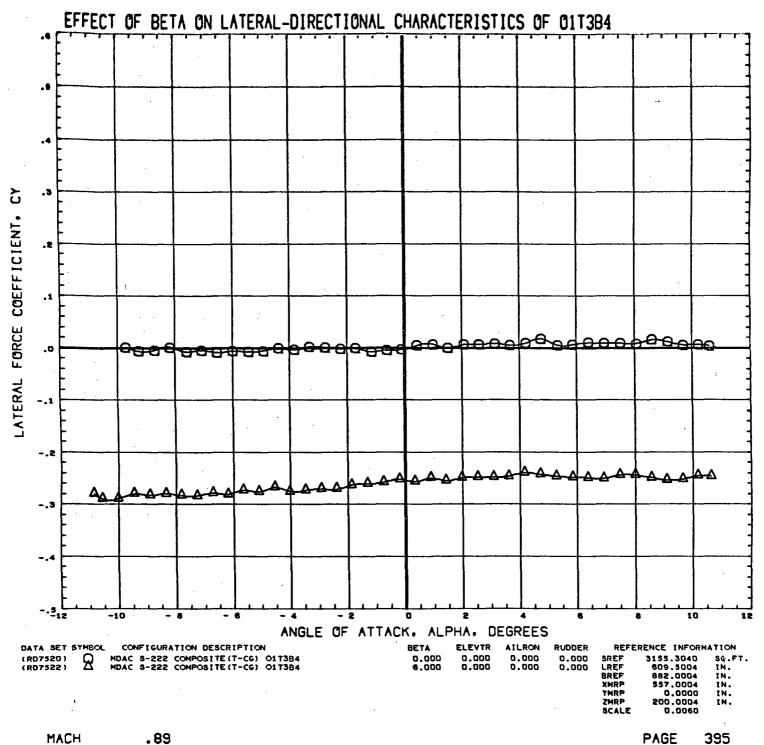




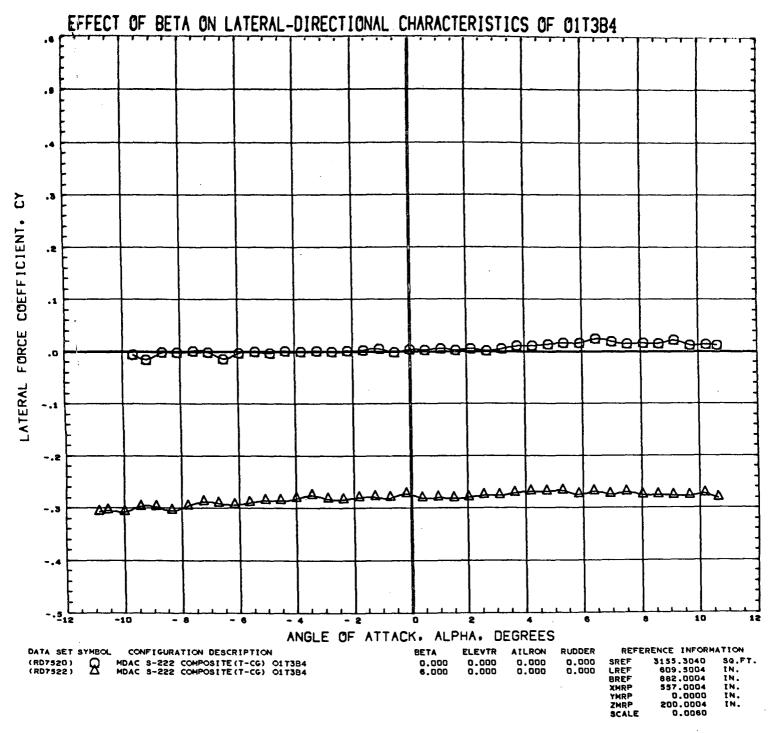
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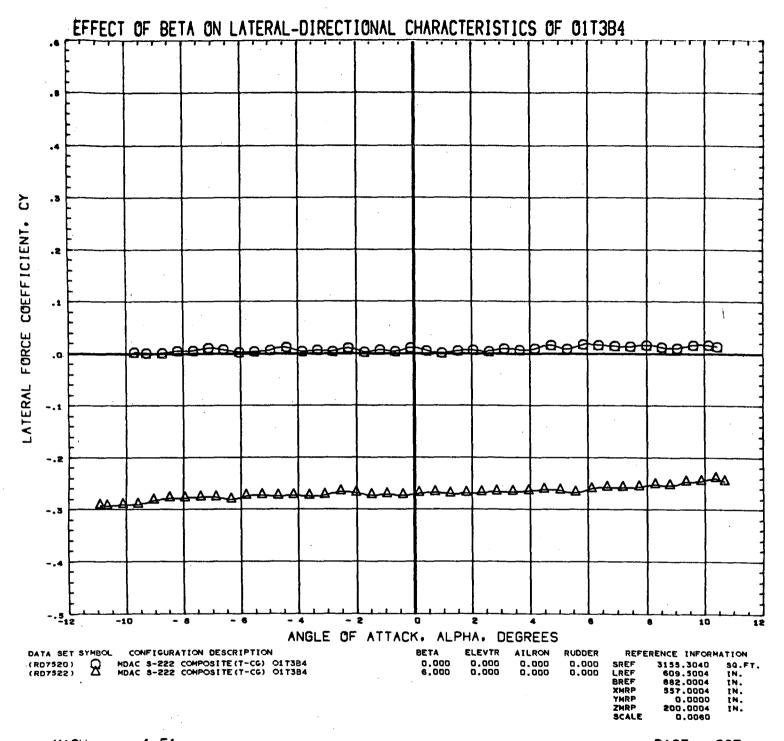


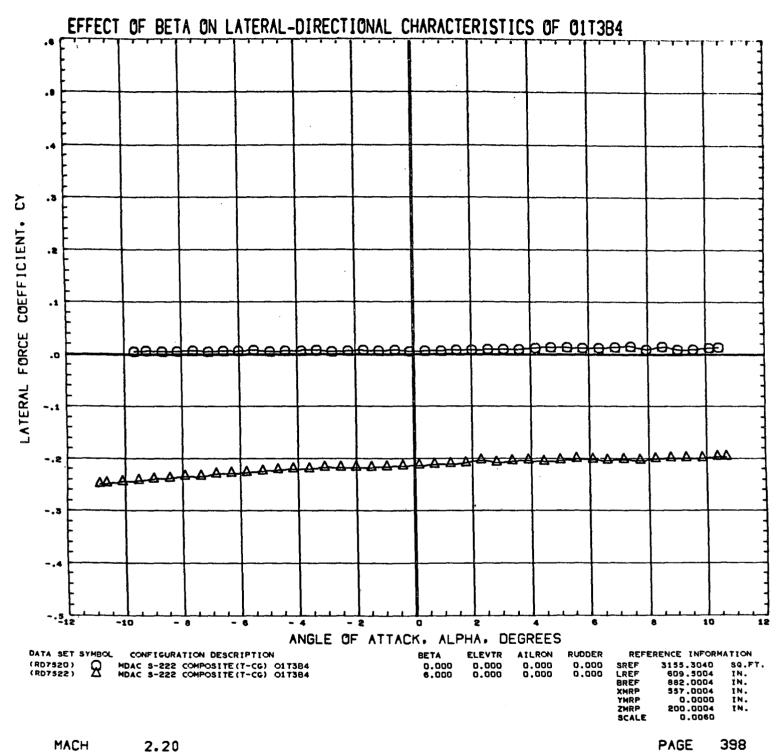
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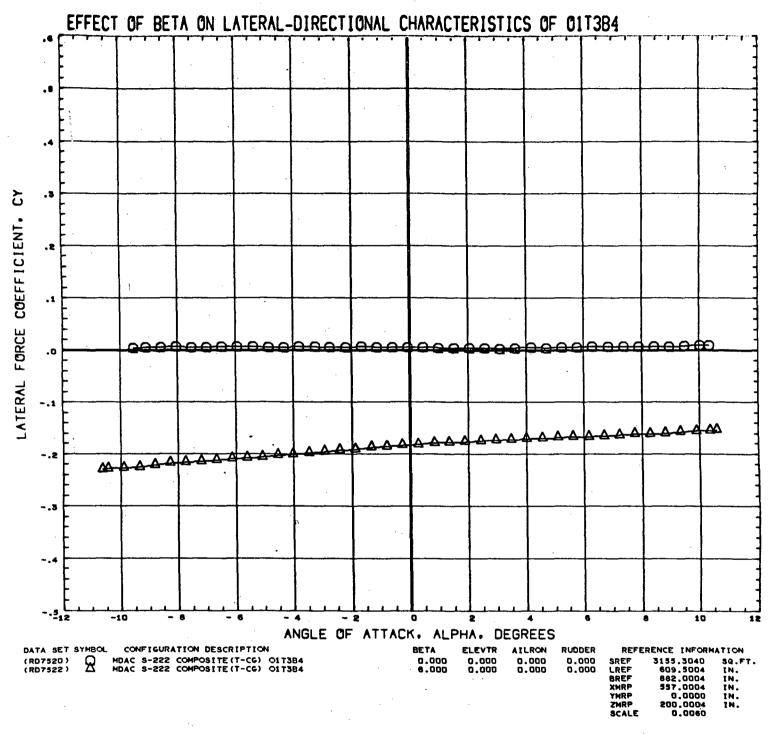
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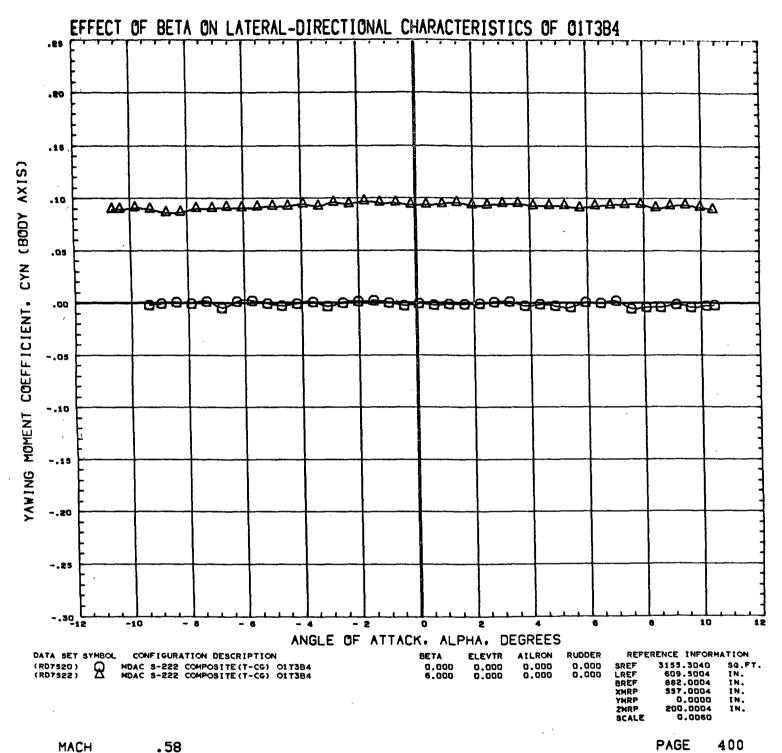


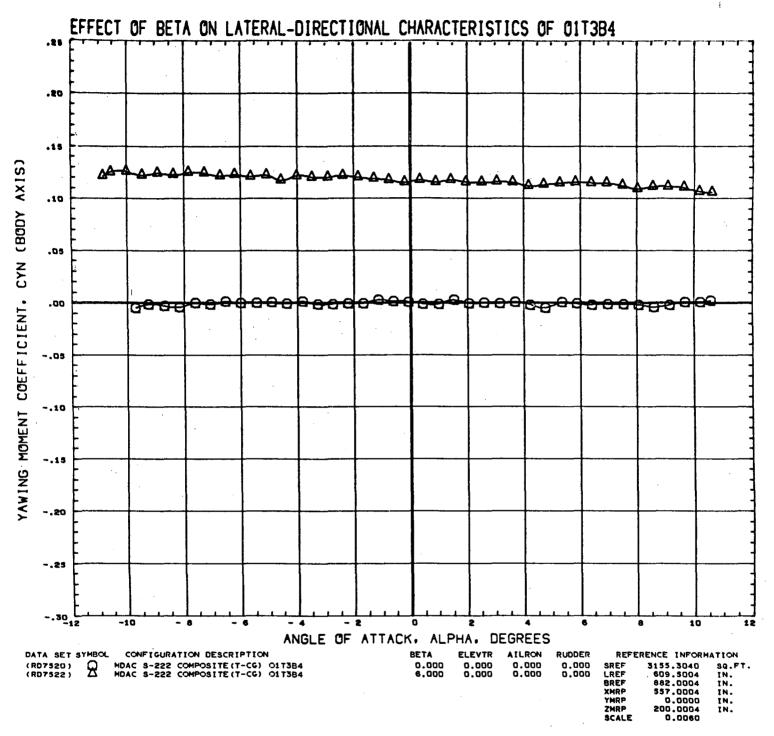


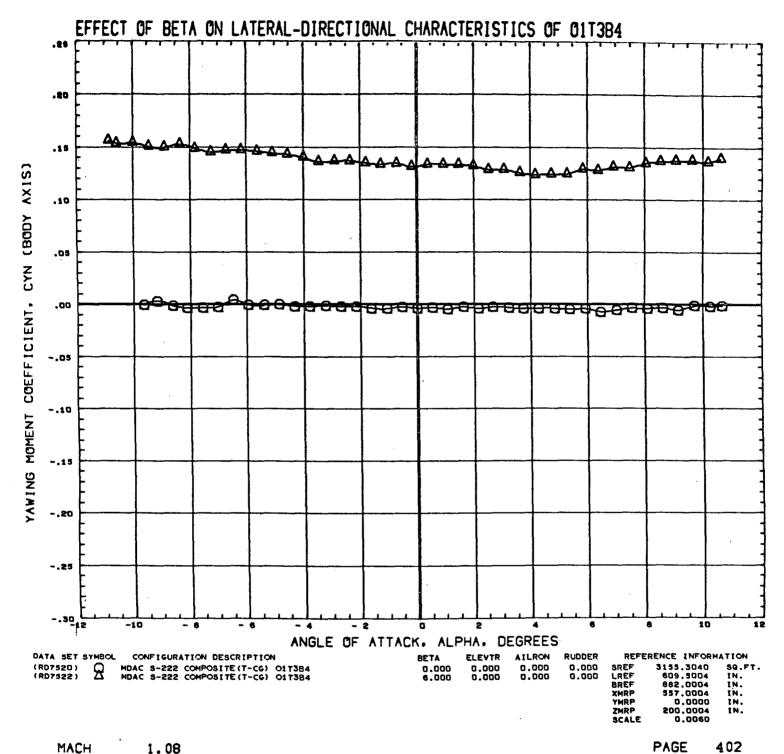
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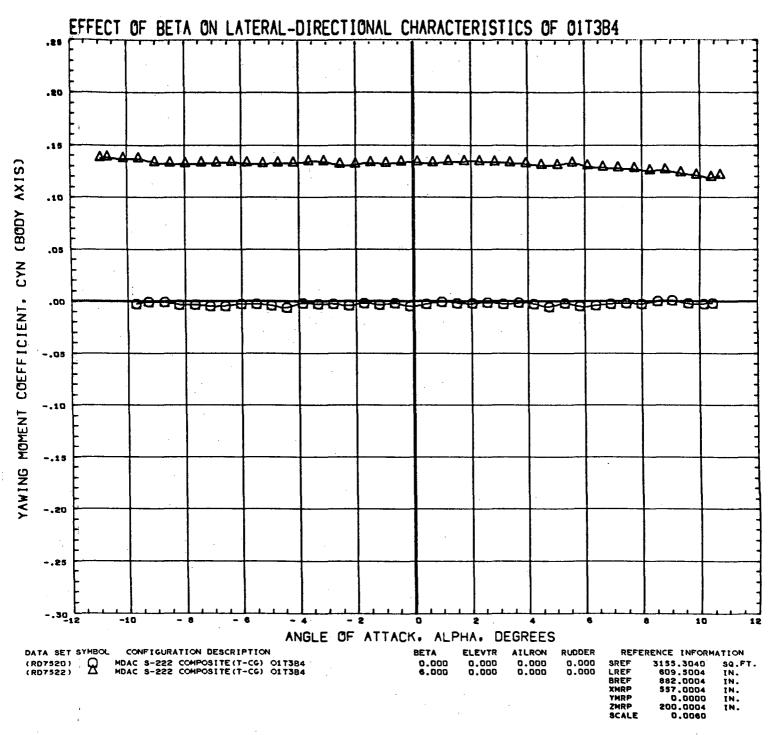


MACH 4.47



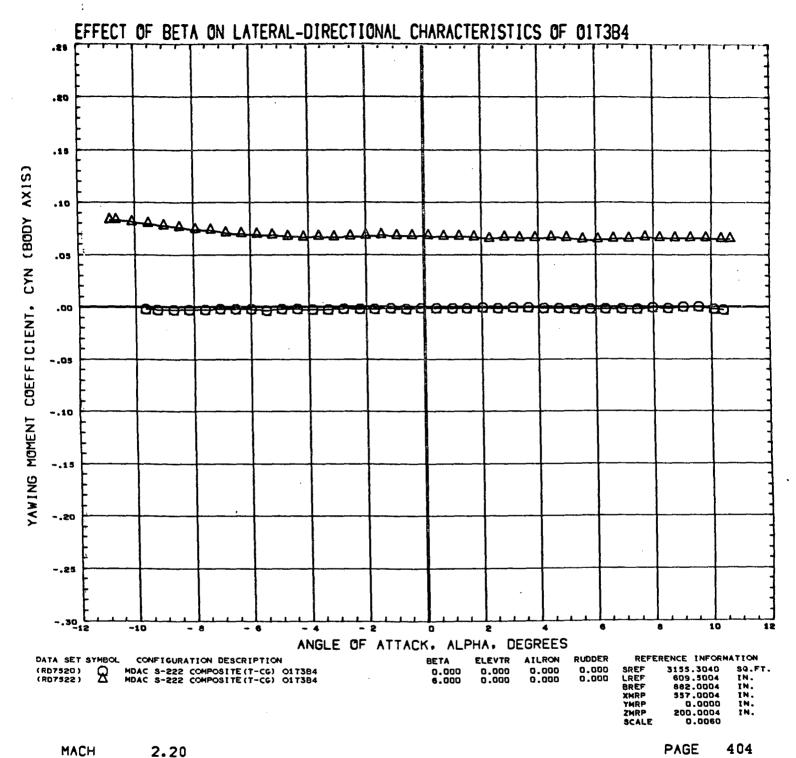


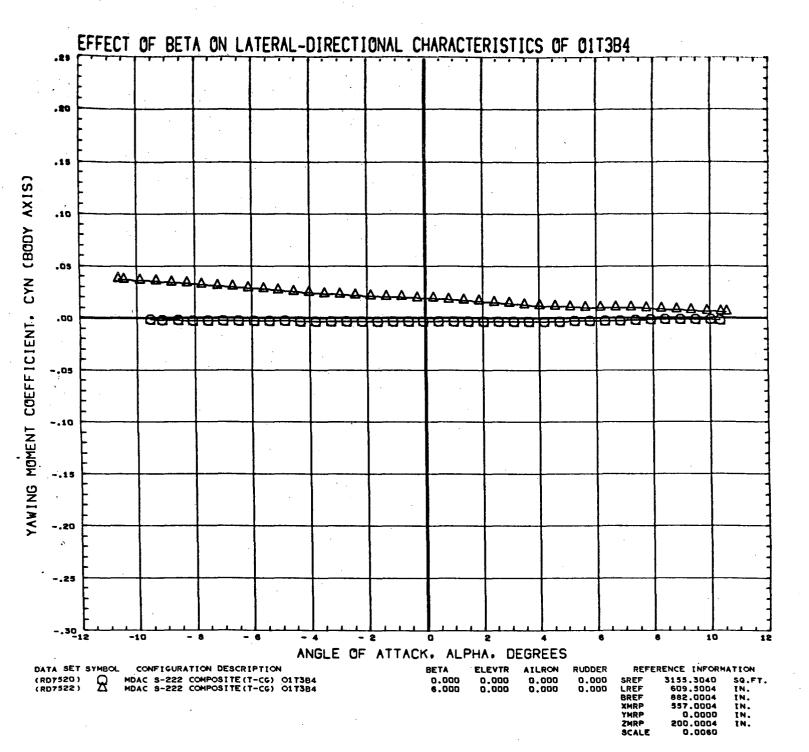




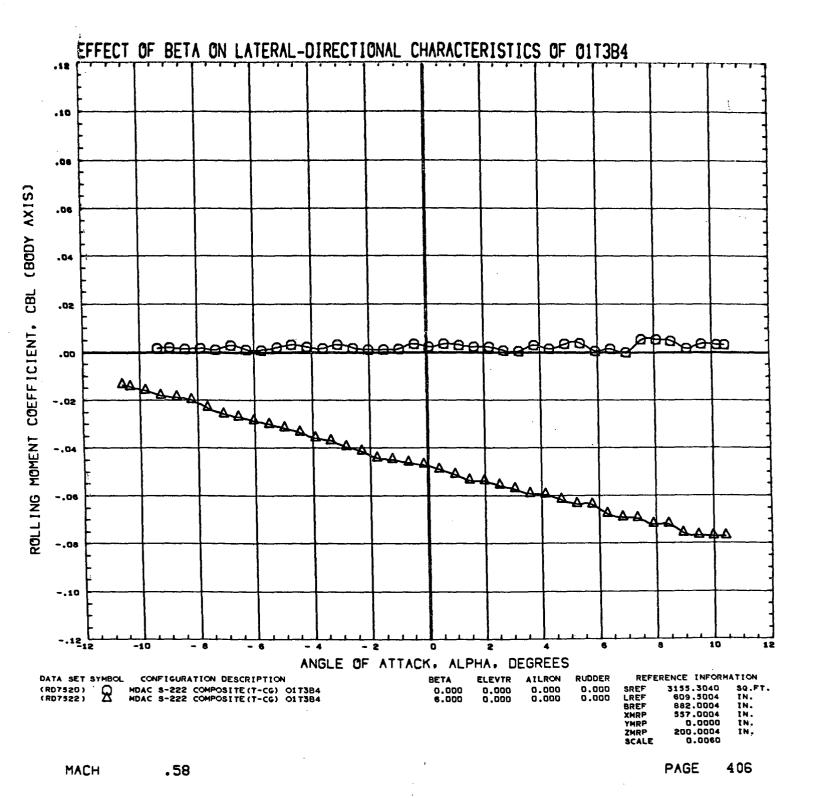
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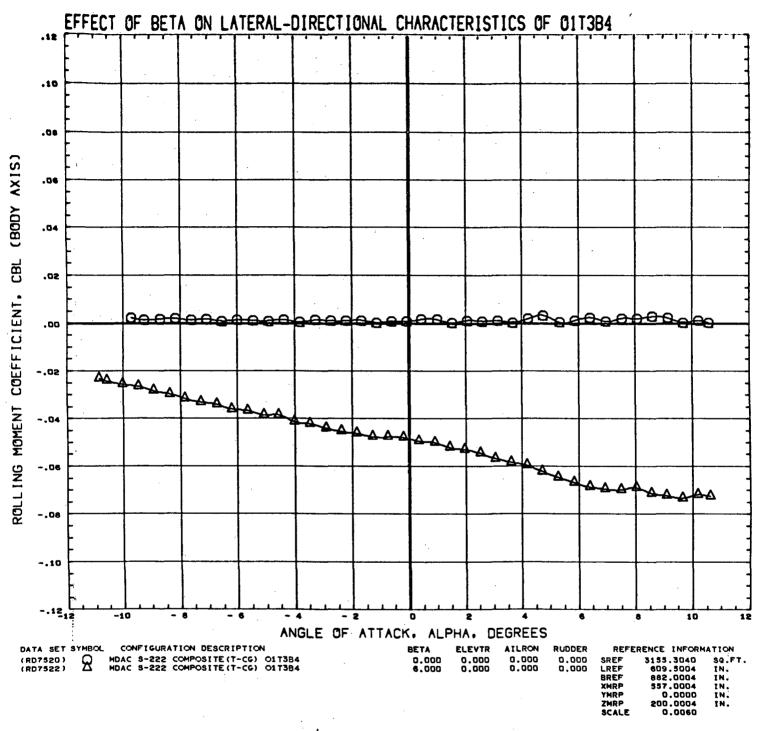
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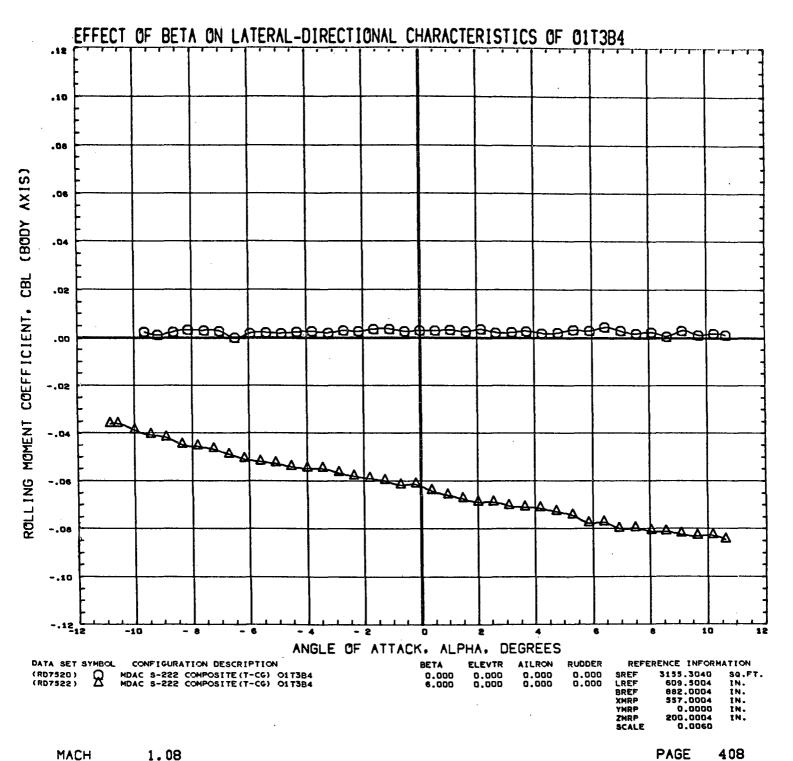


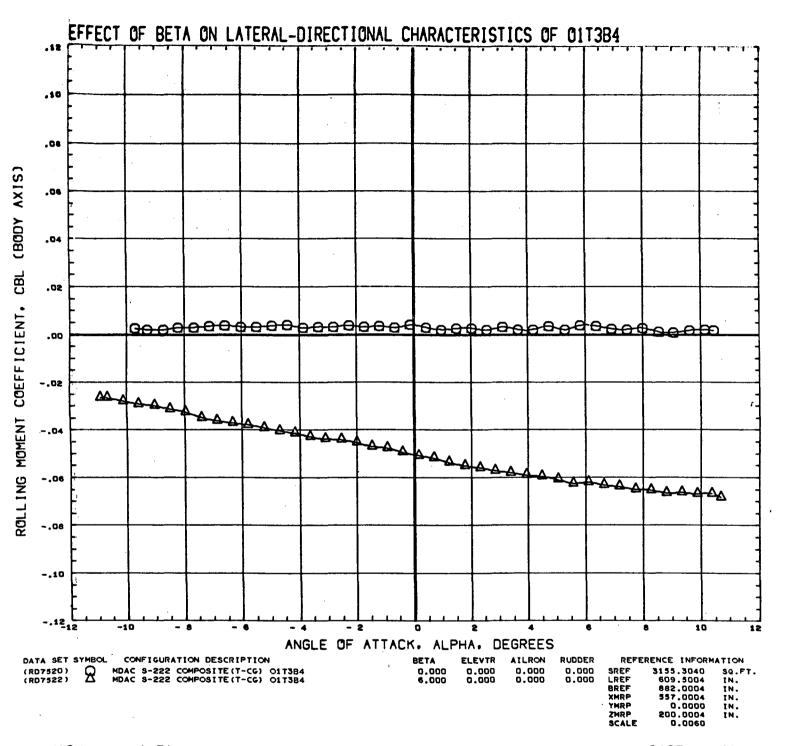


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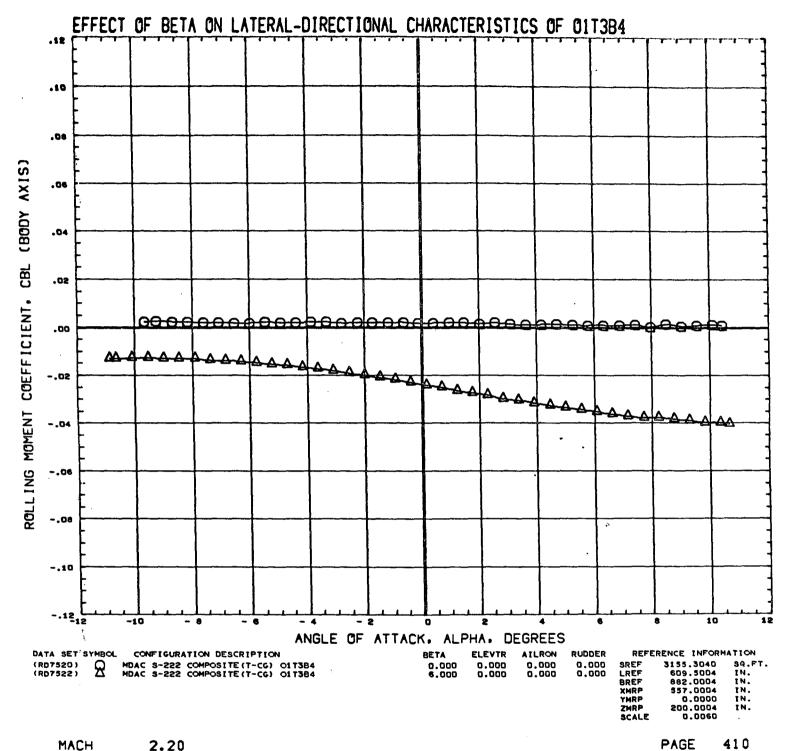


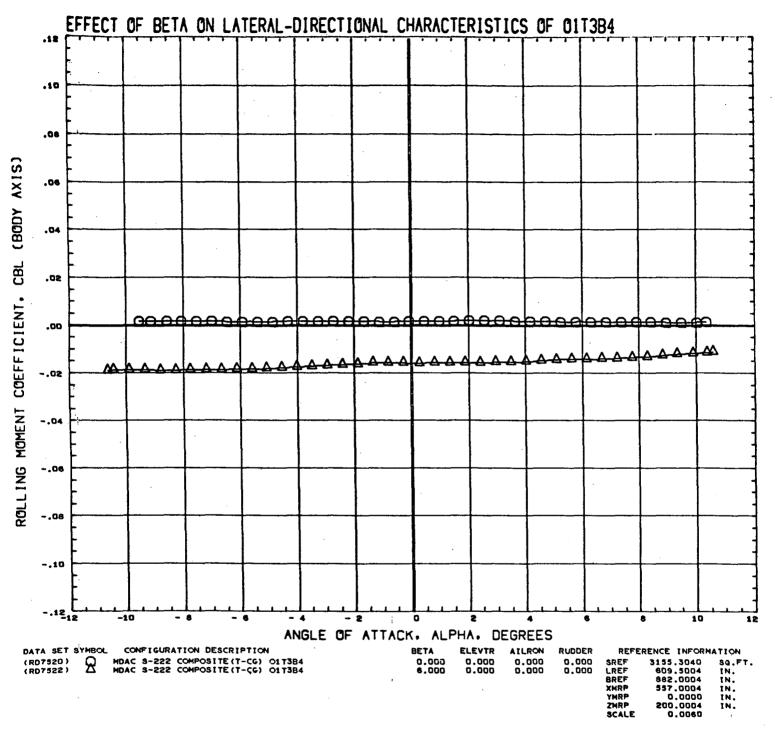
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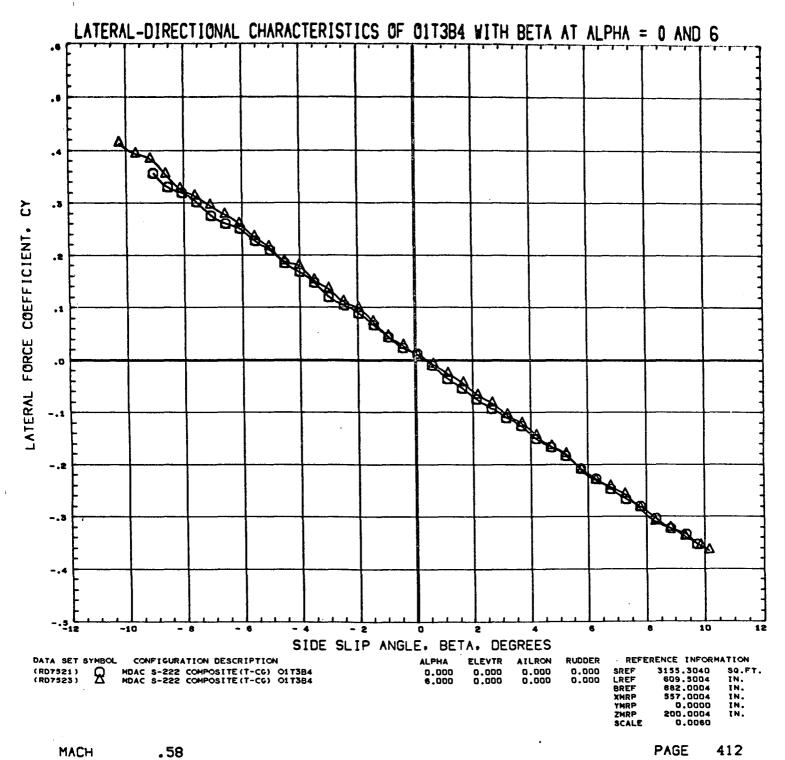
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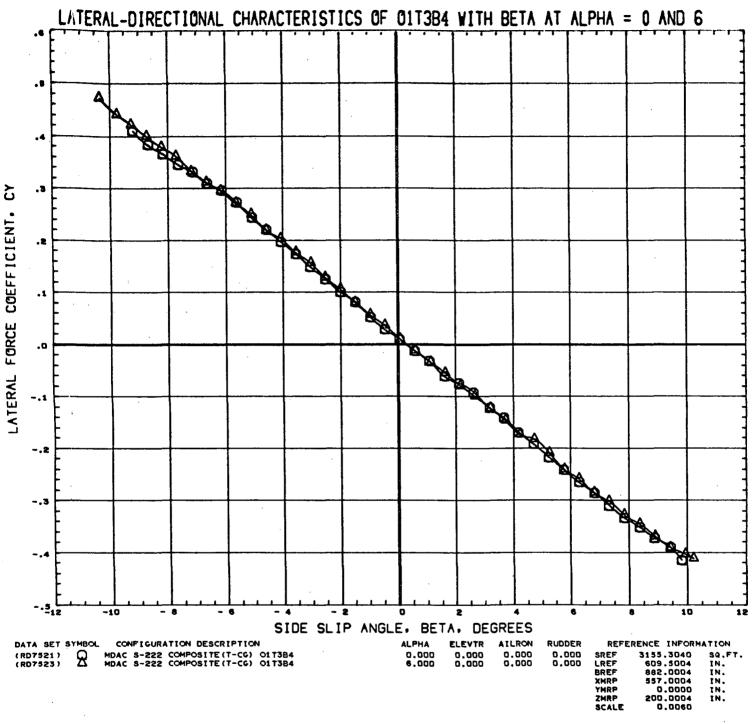
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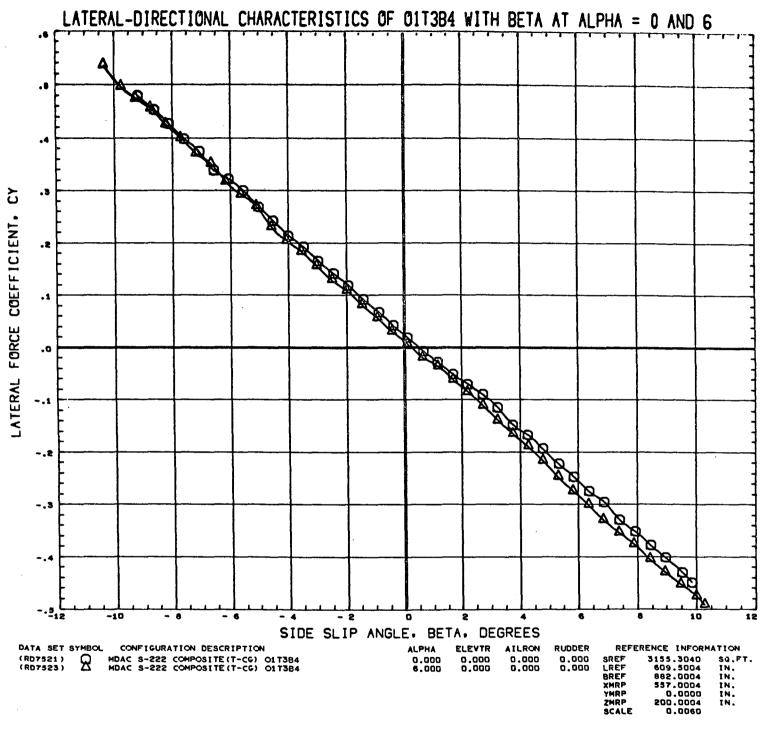
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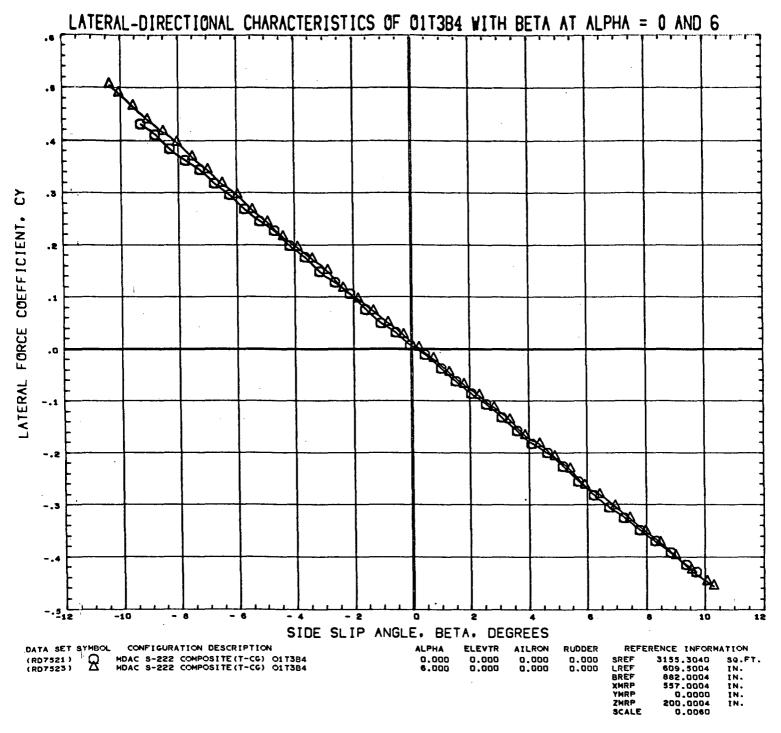


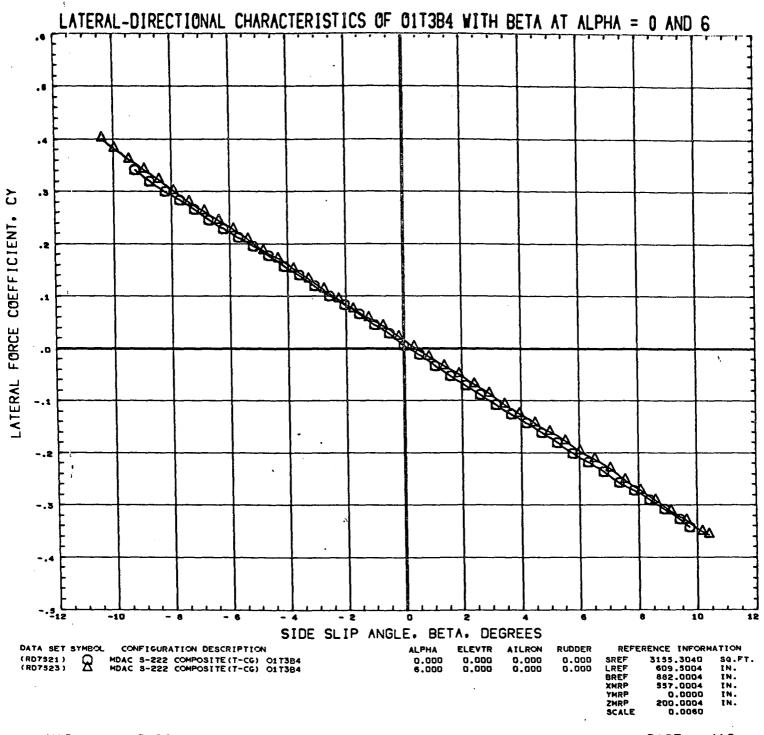


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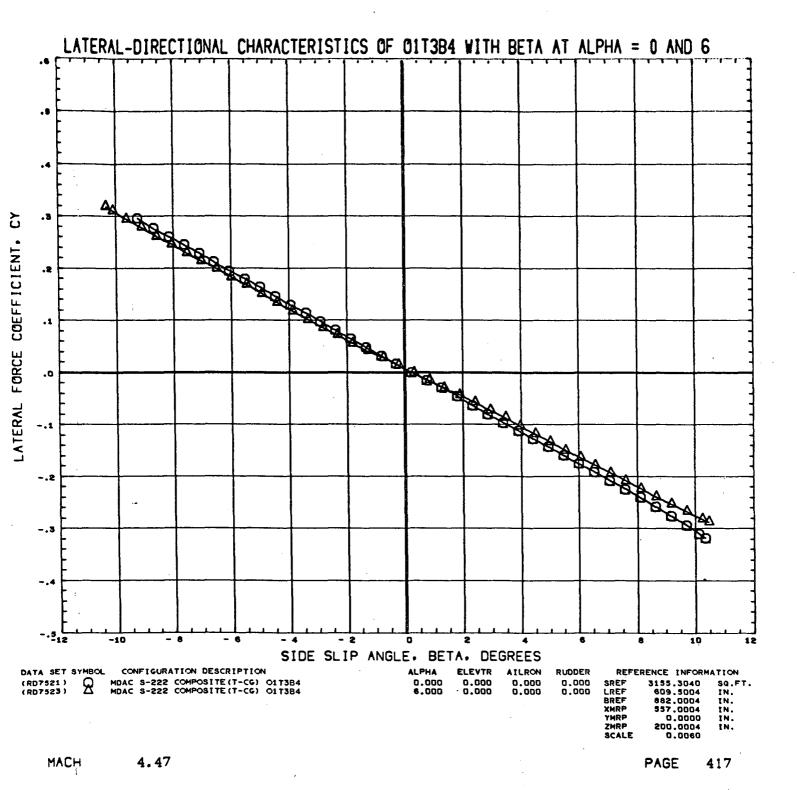
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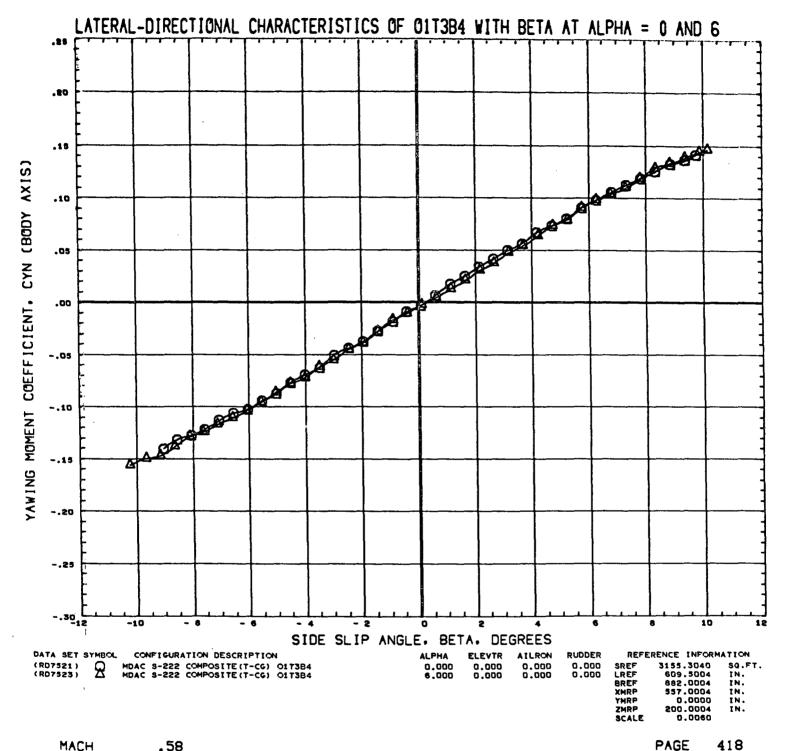






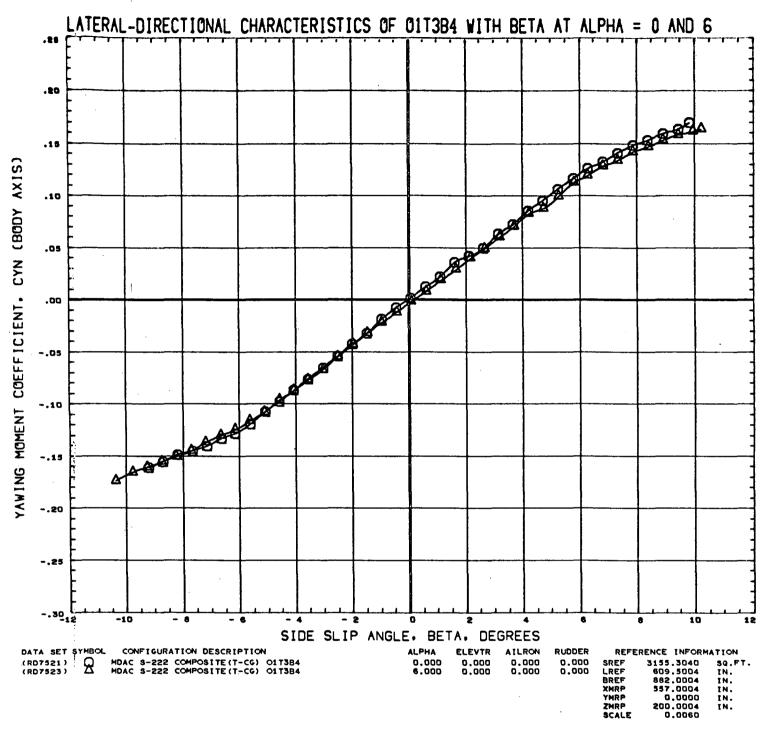
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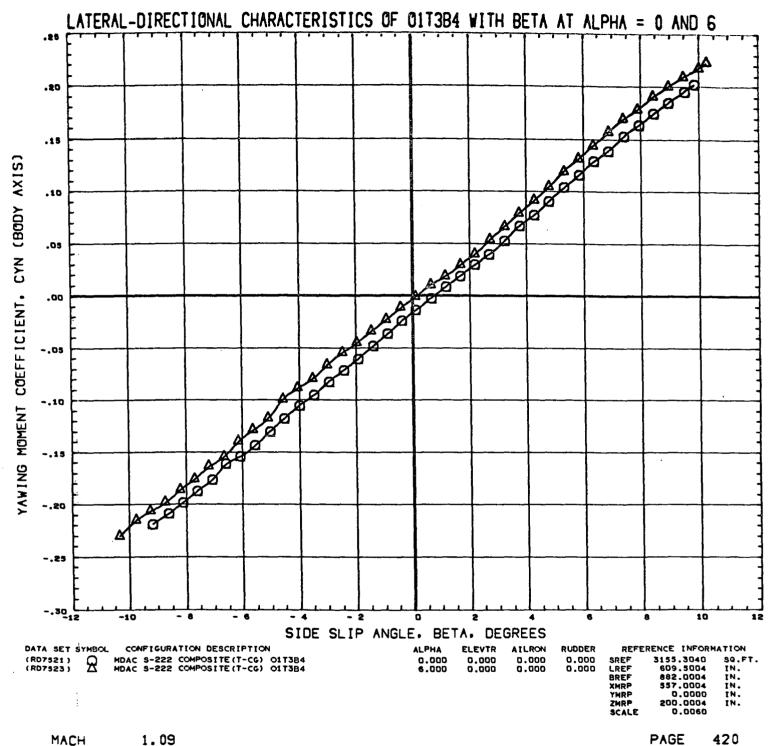




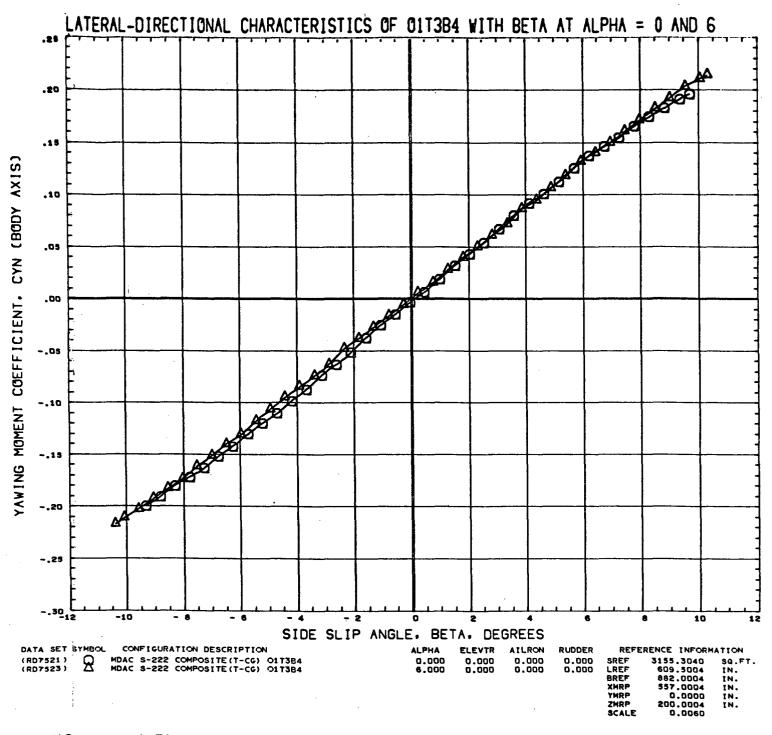
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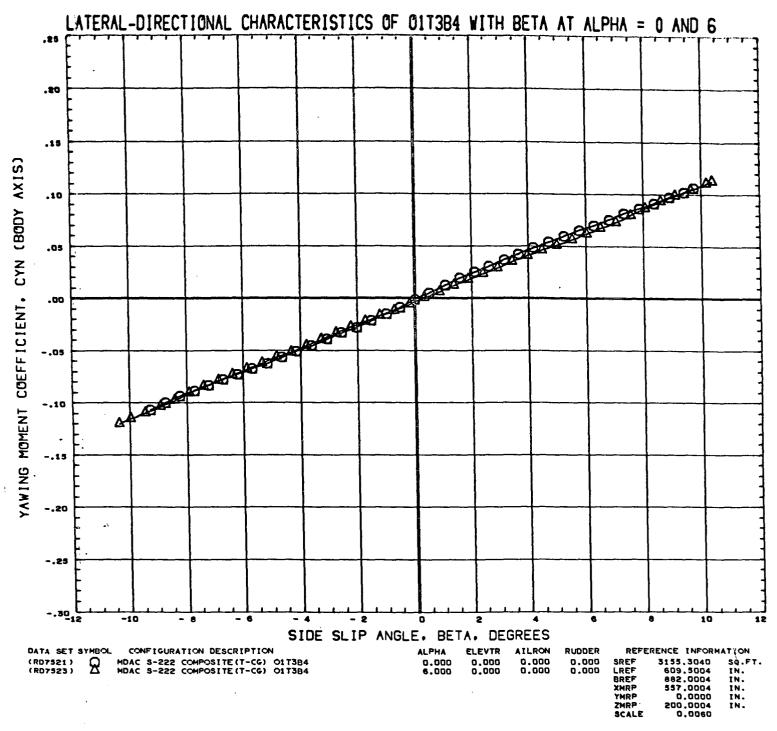
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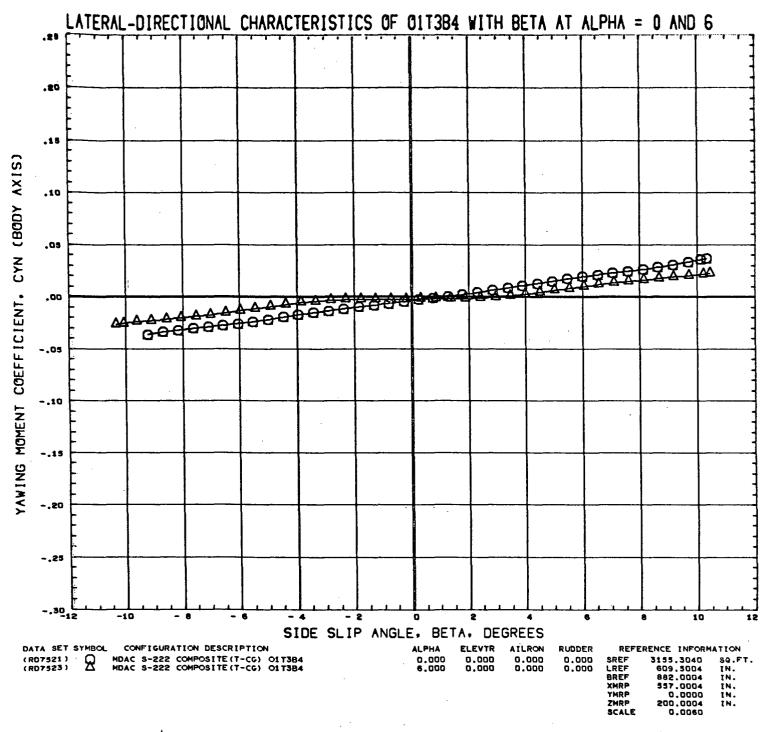
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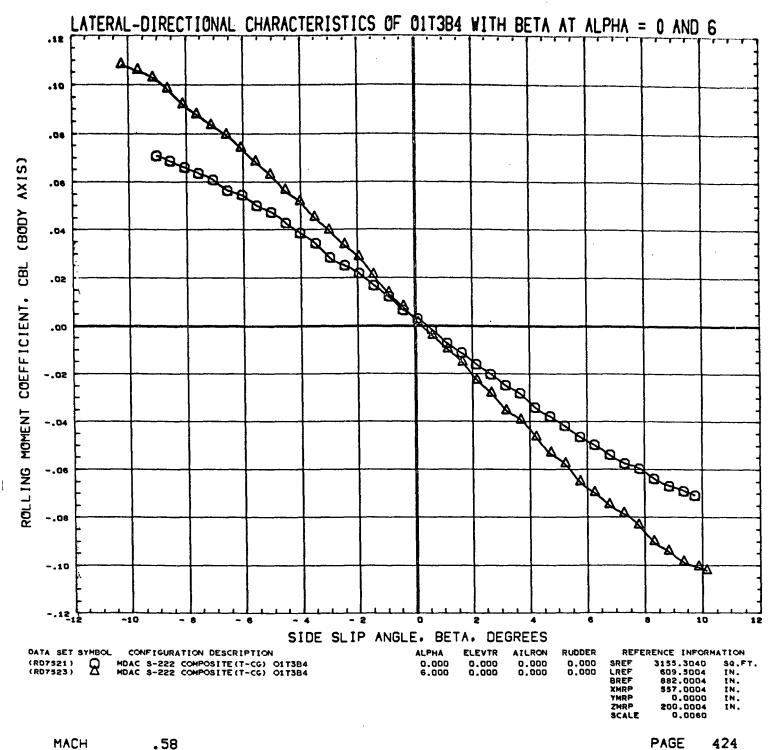


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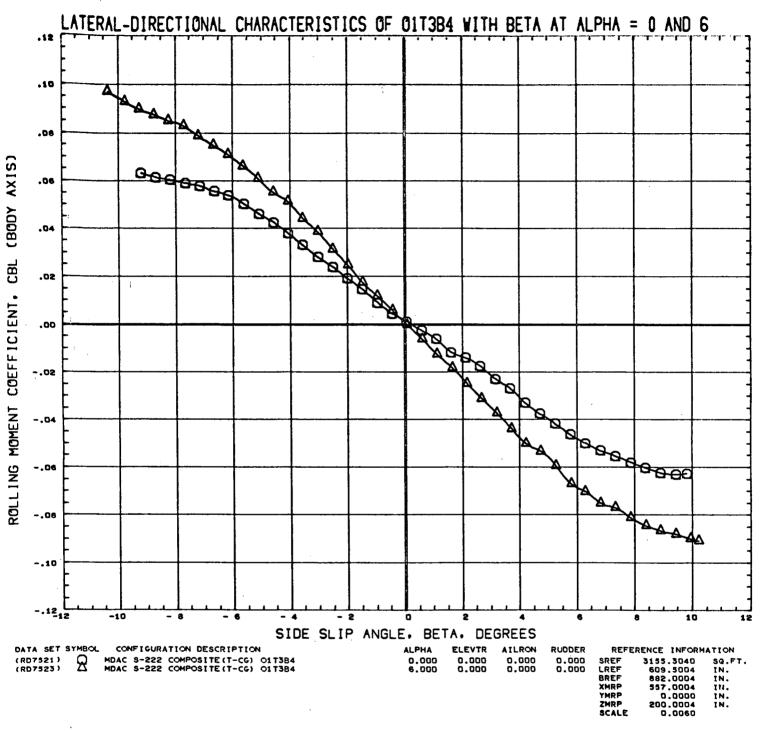
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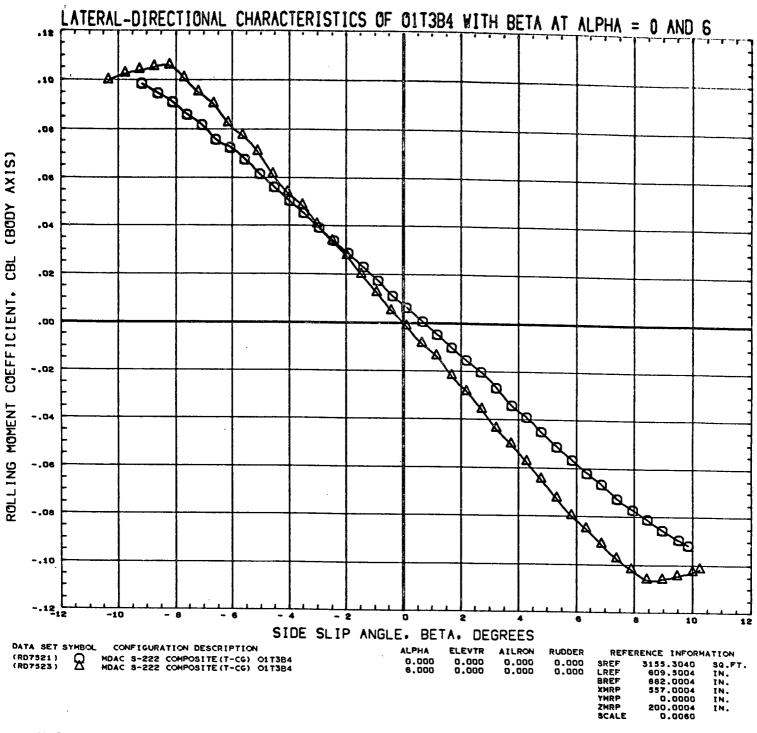


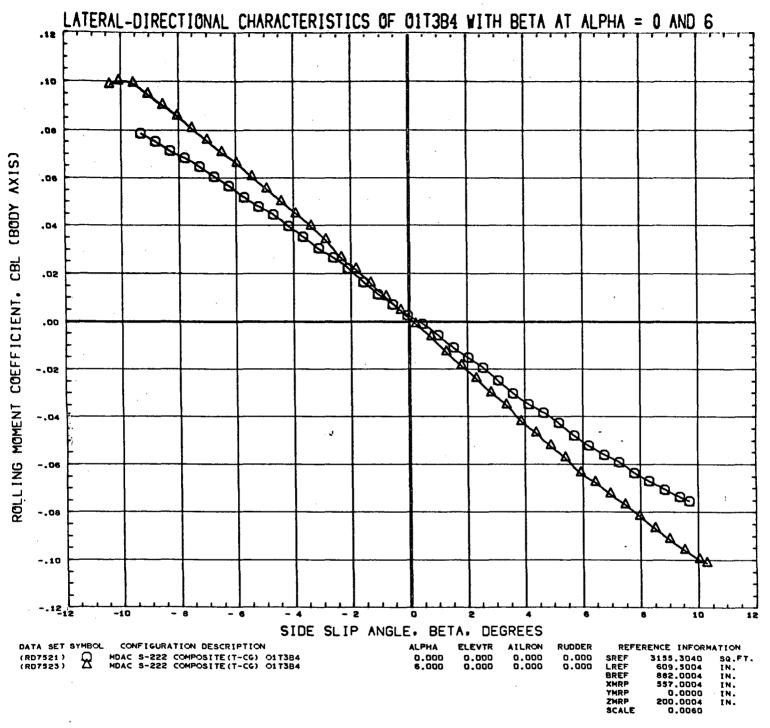
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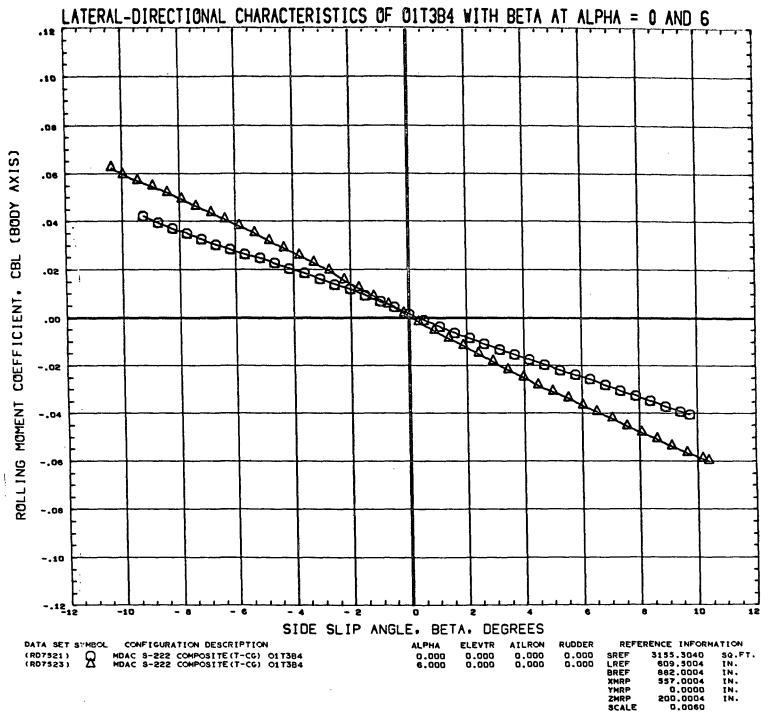


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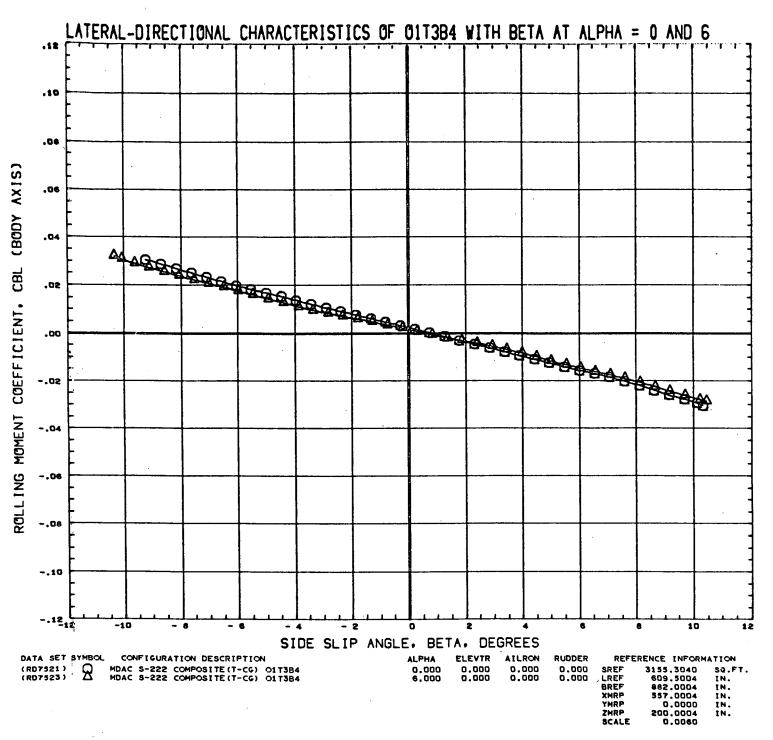




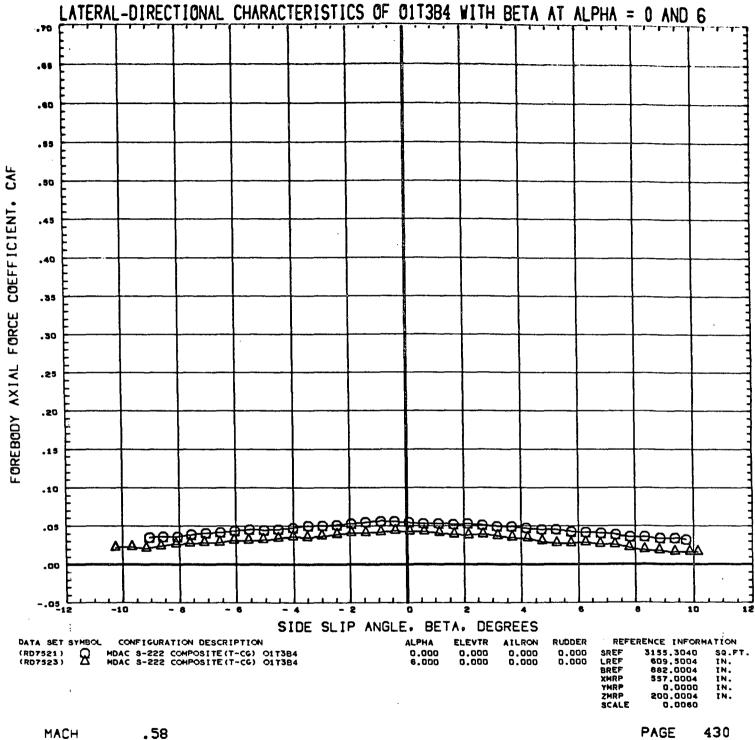


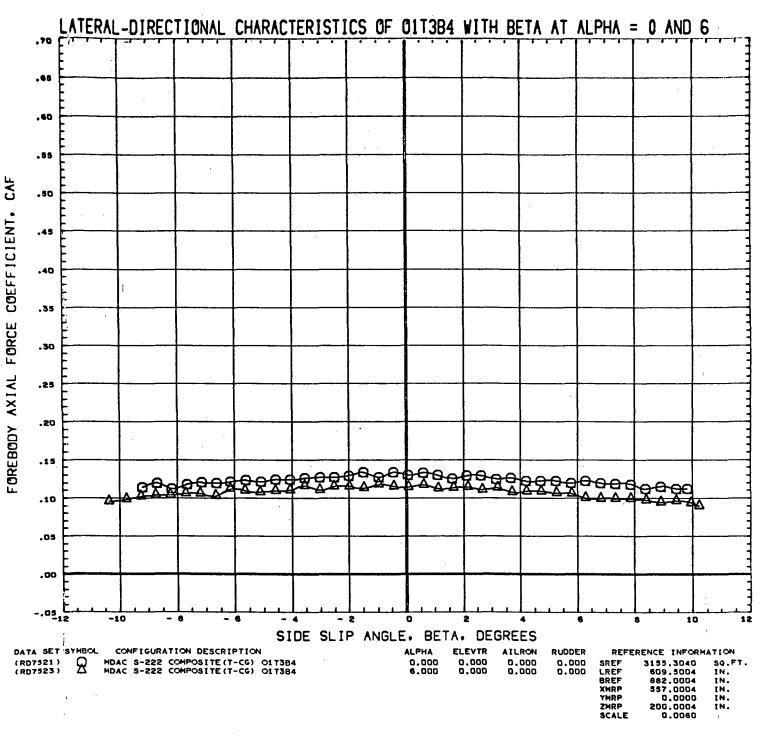
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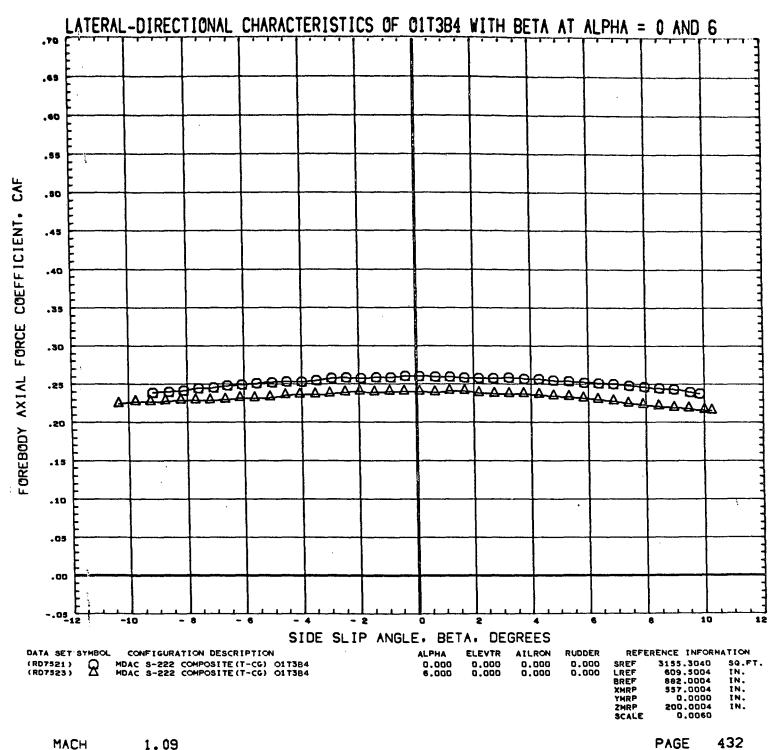
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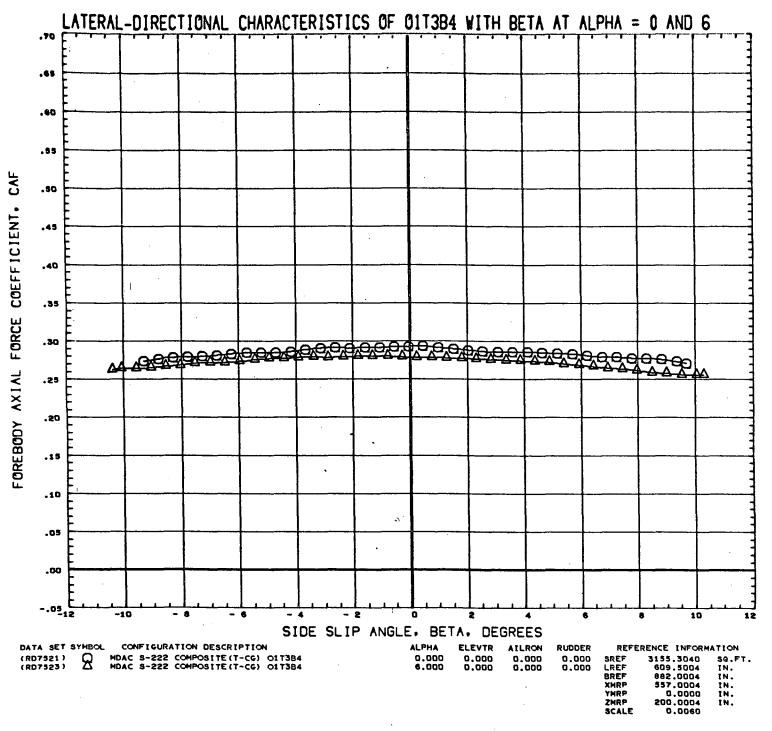


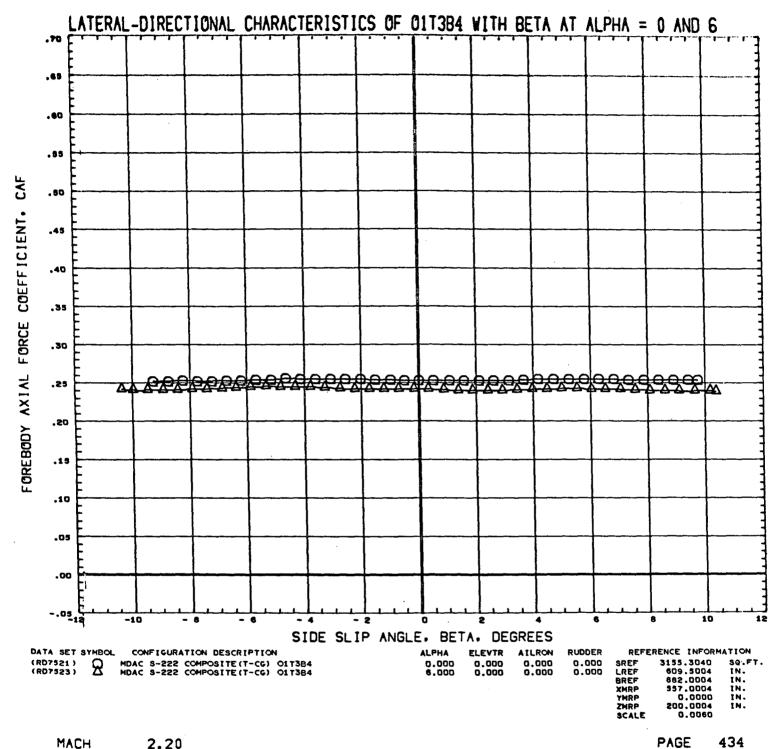
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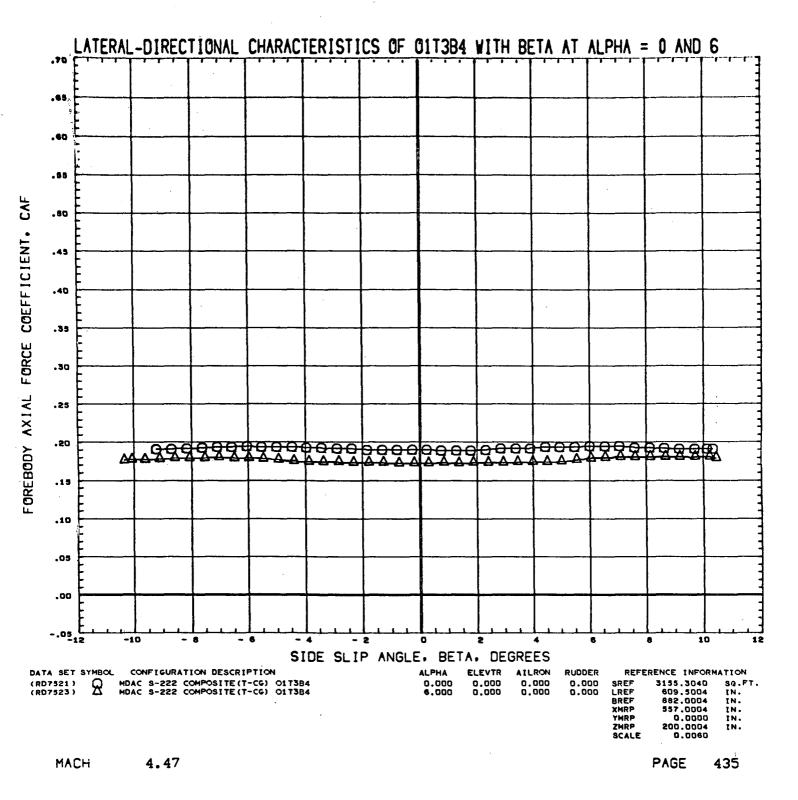


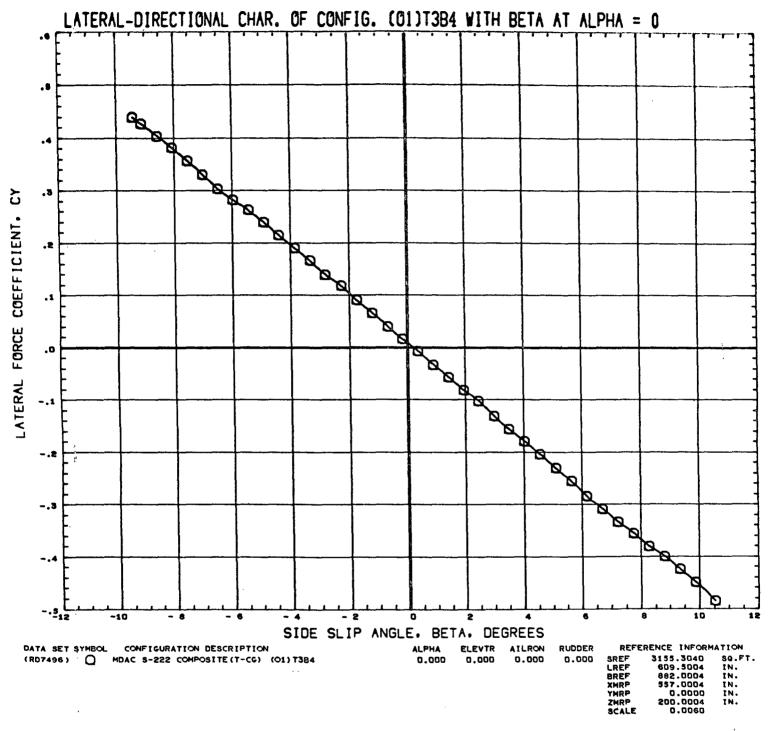






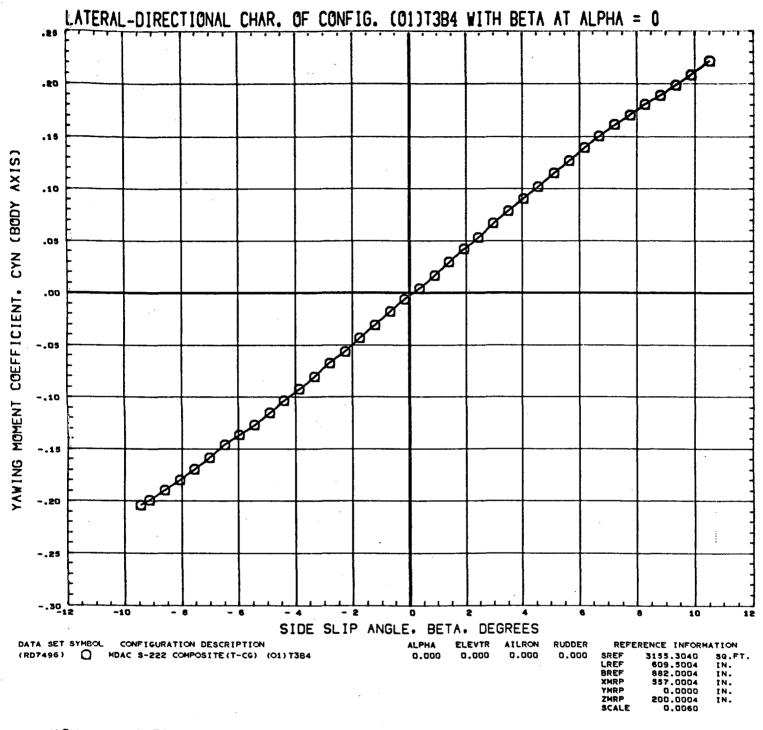


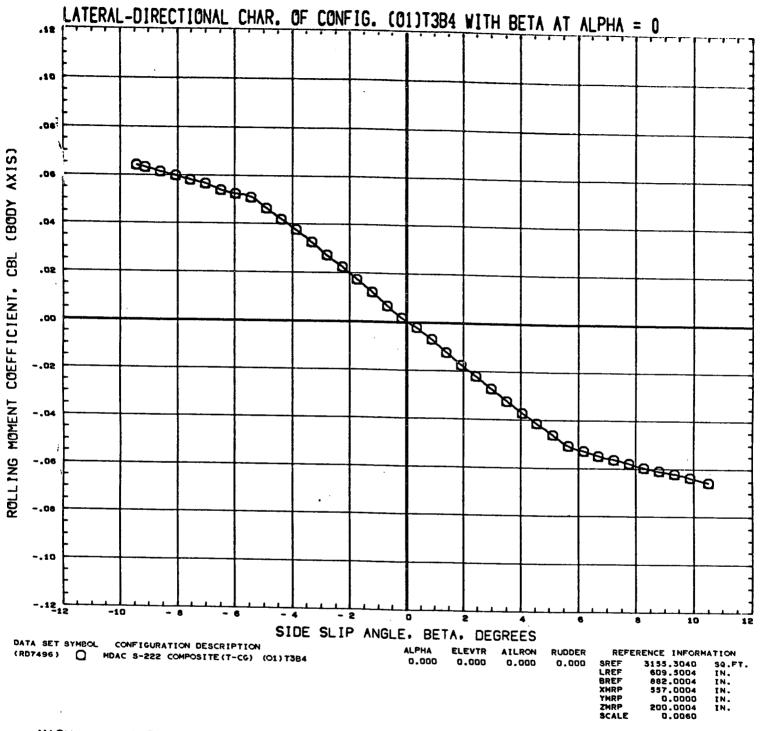


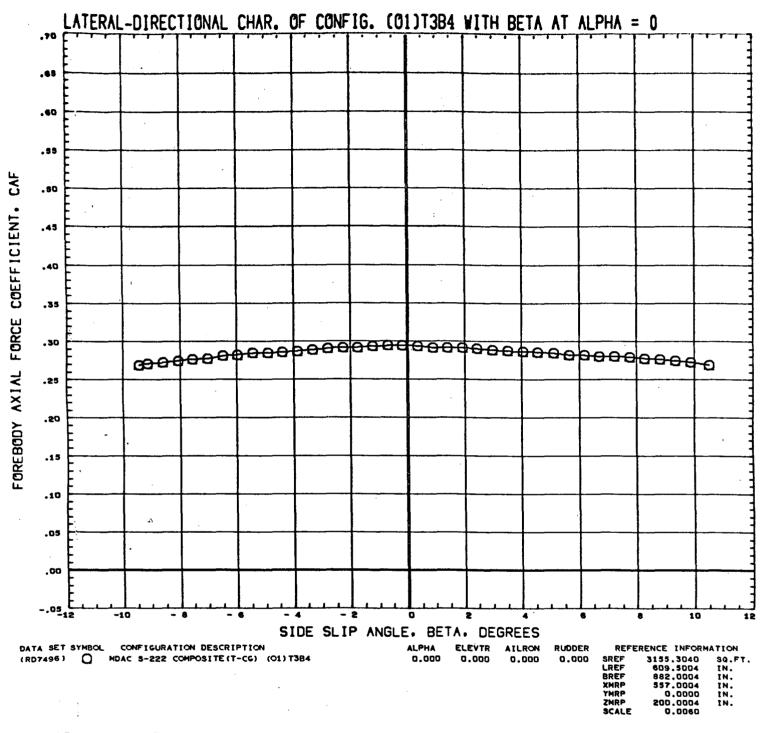


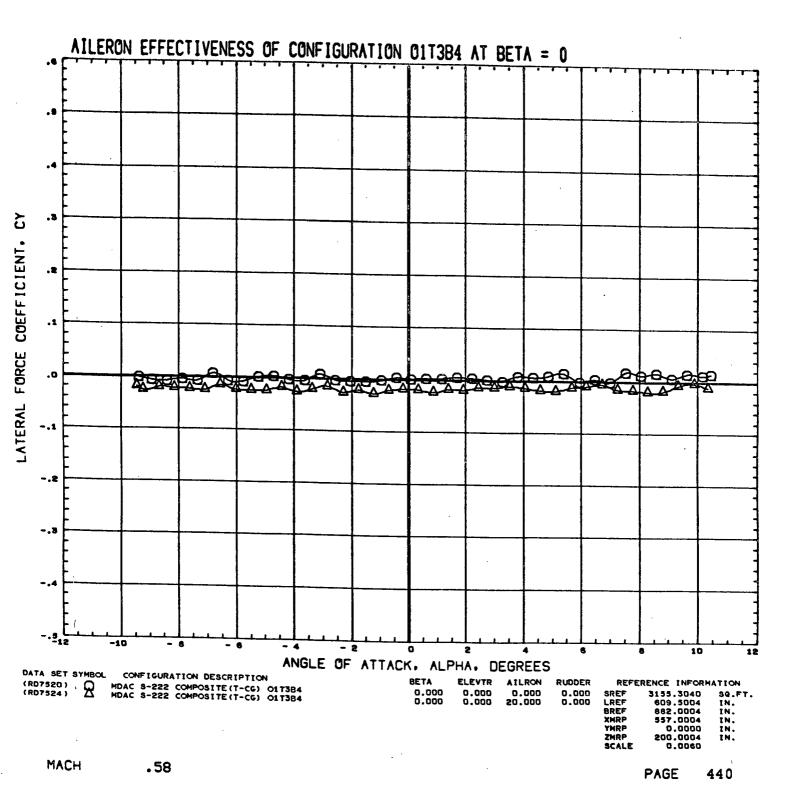
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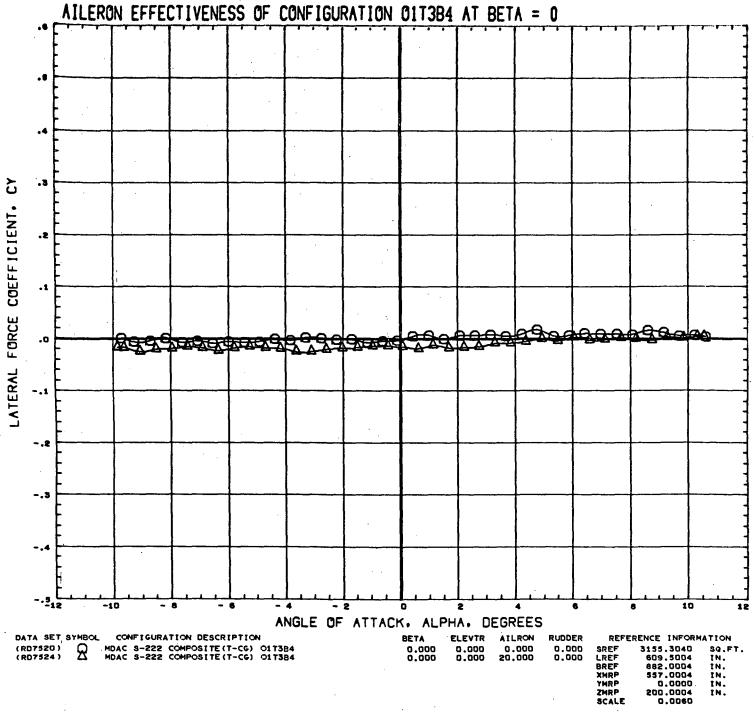
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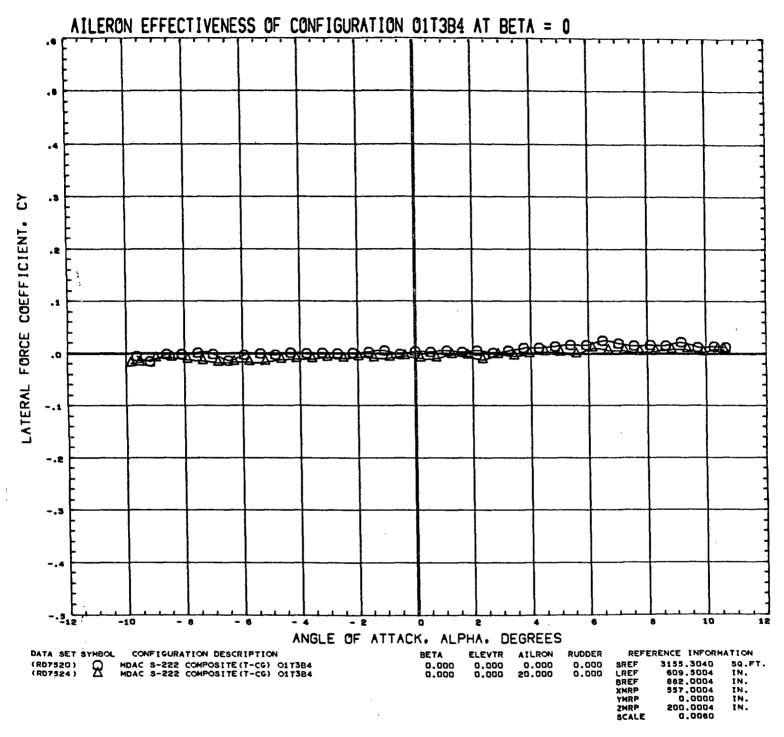






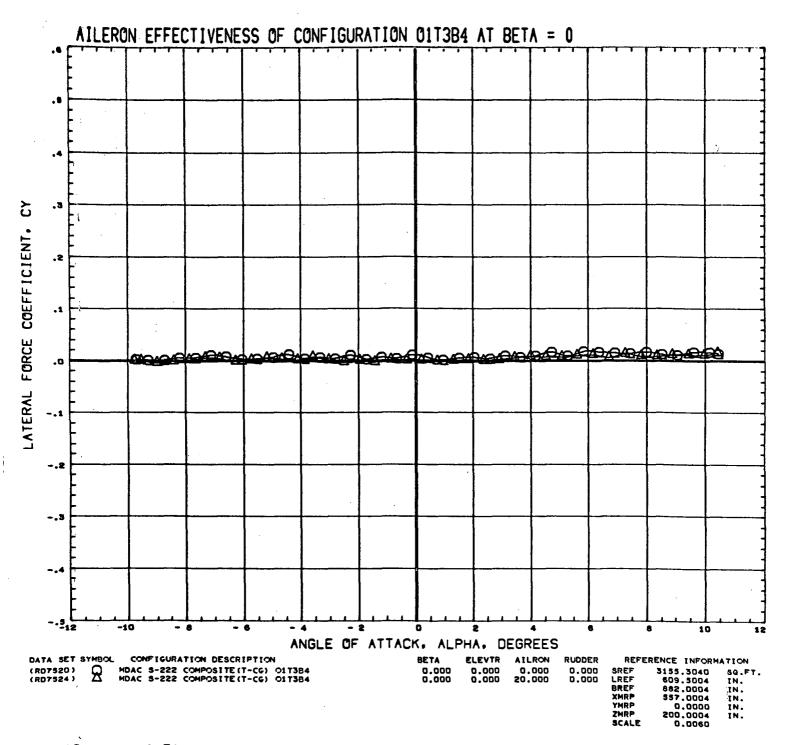


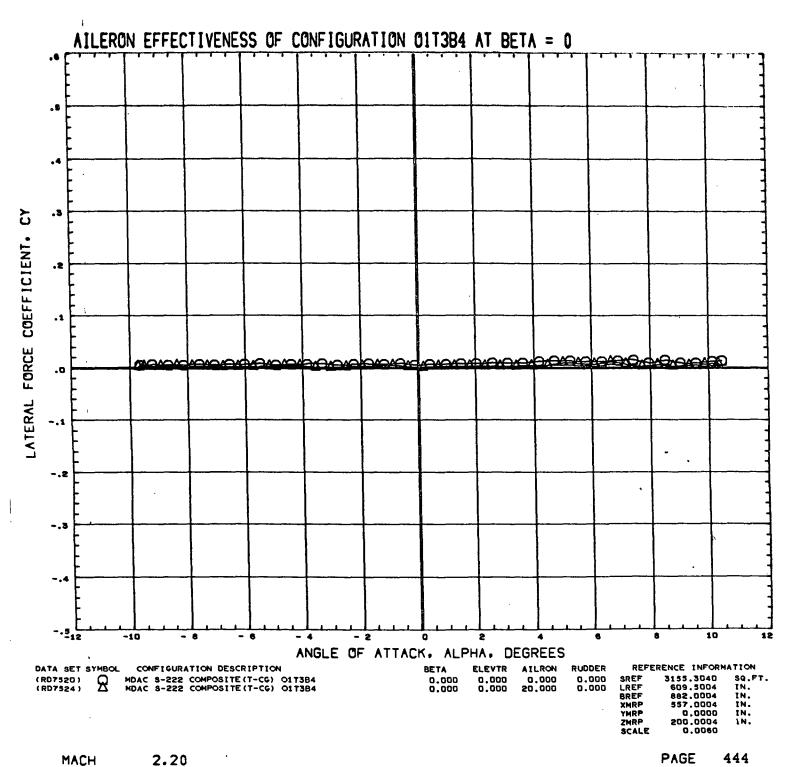


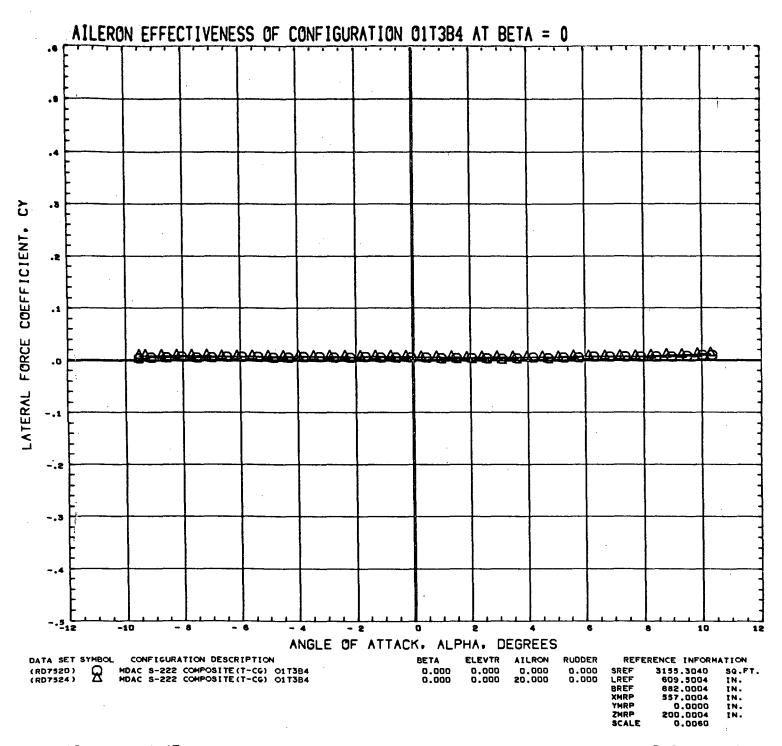


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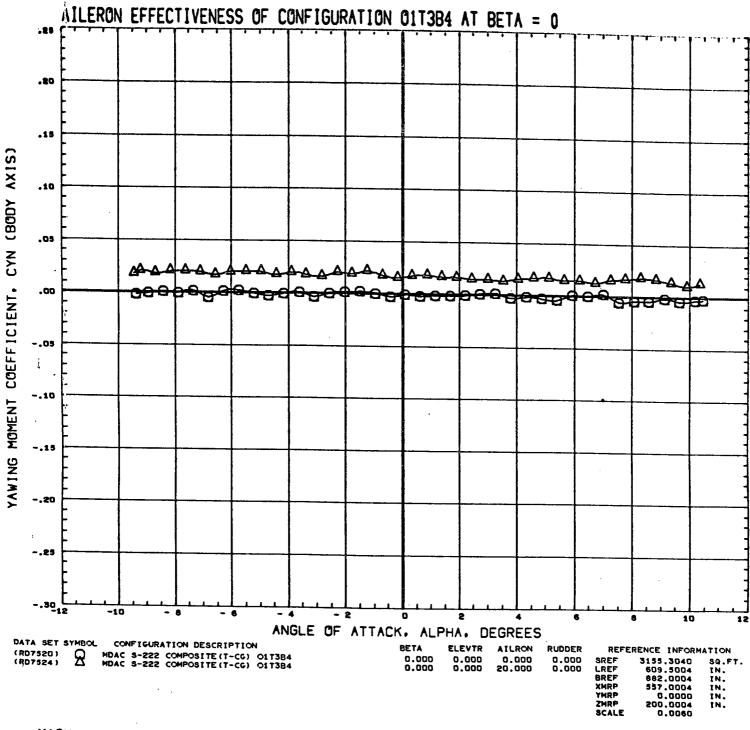
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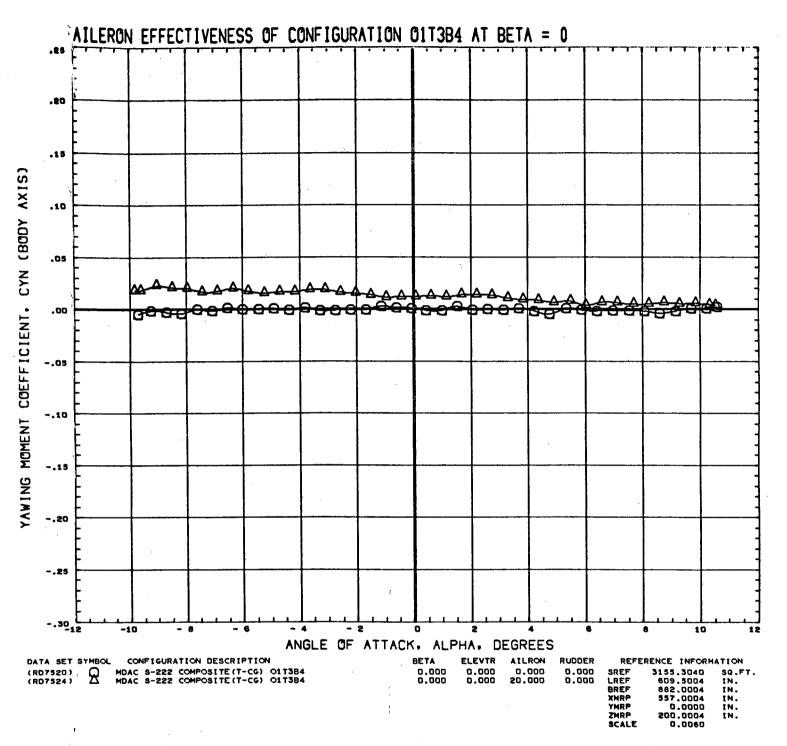


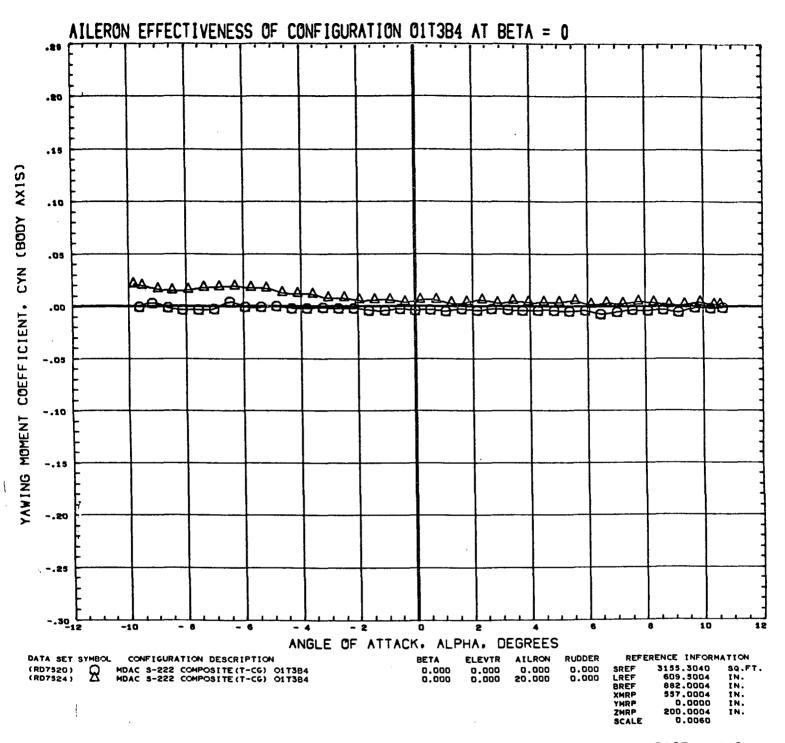




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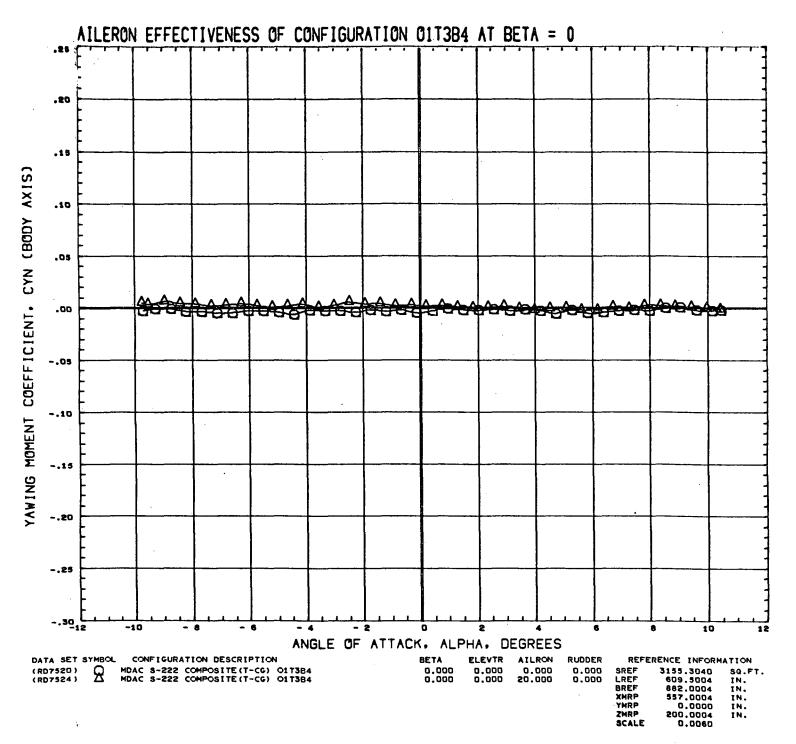


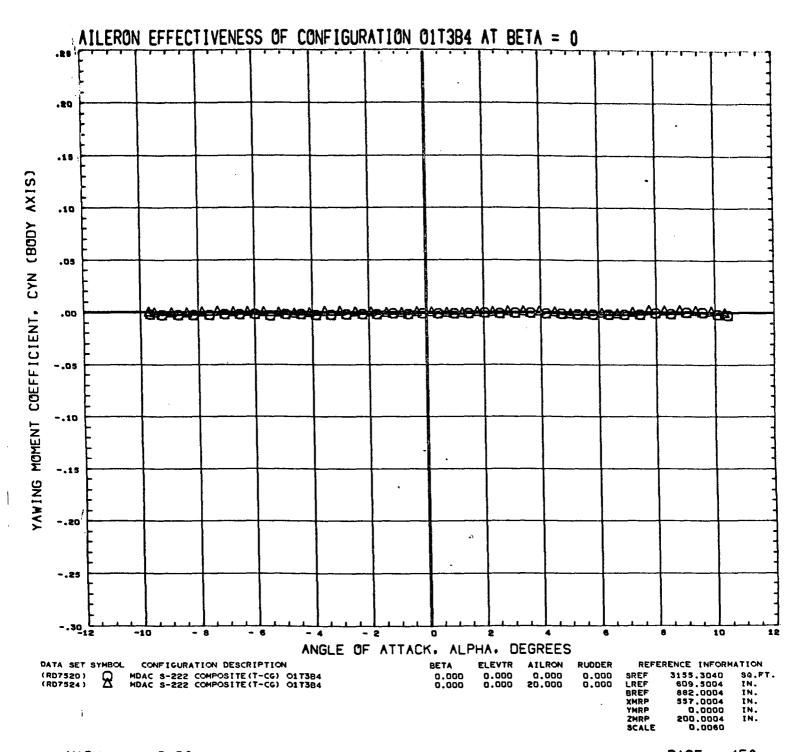




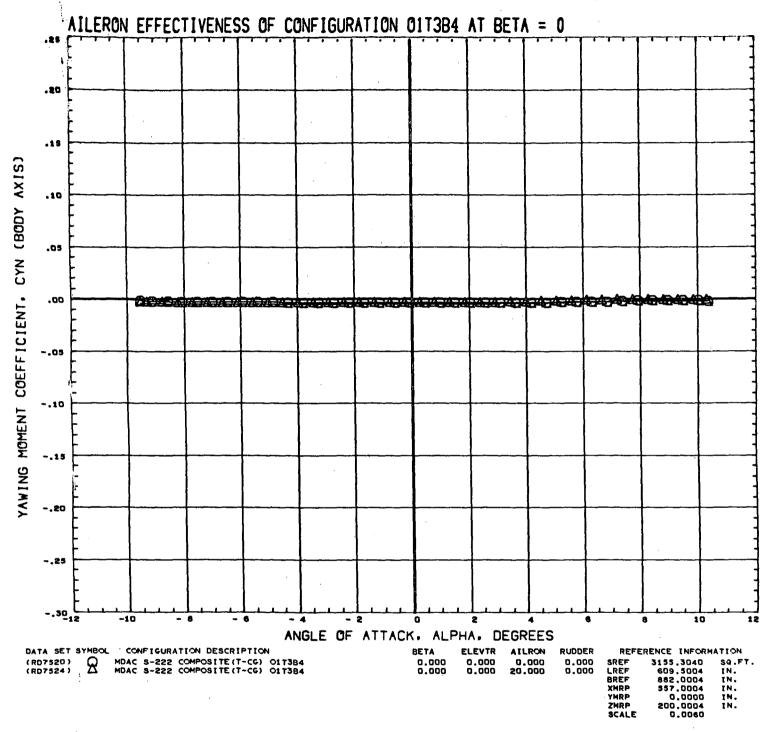
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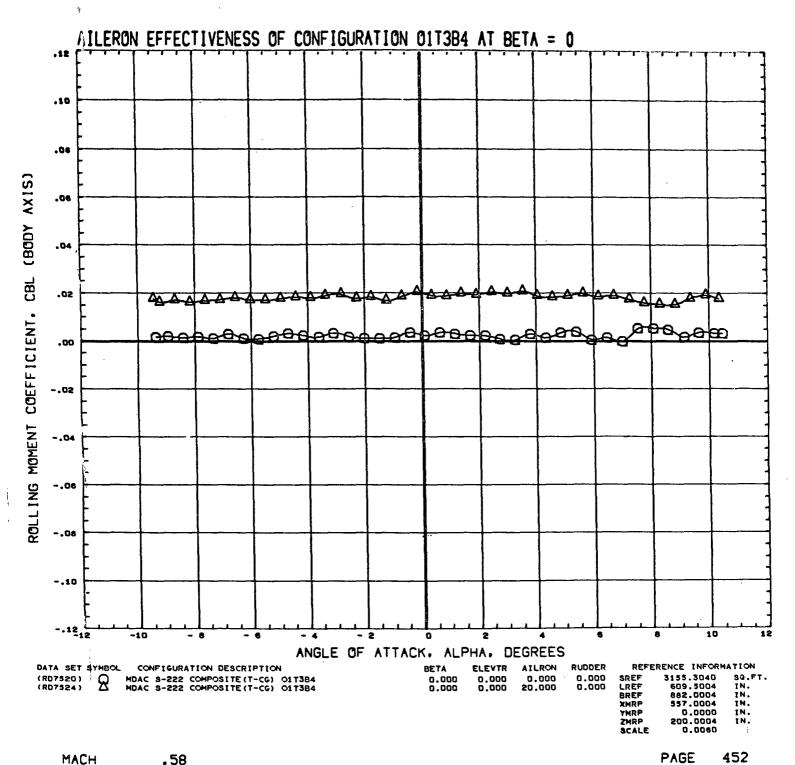




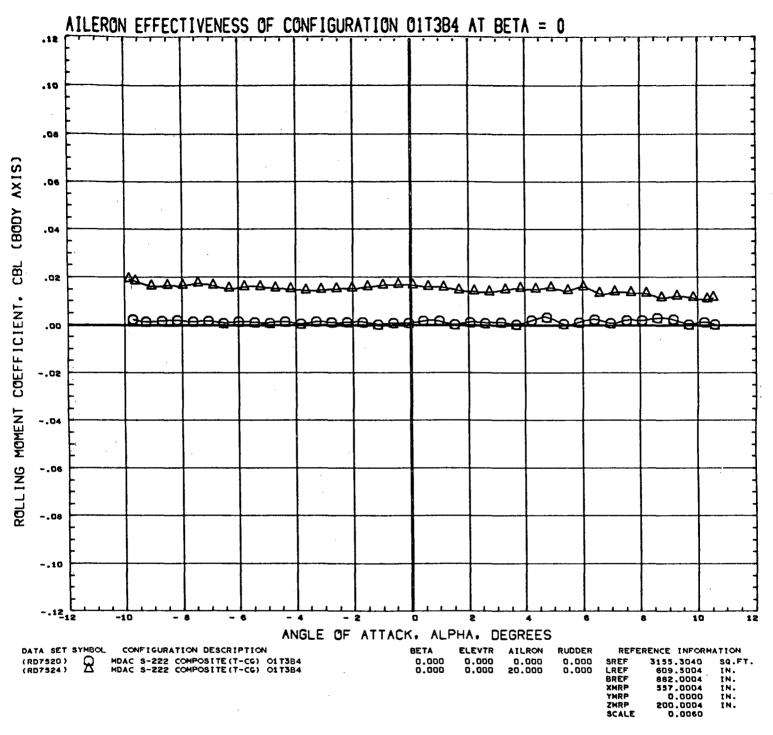
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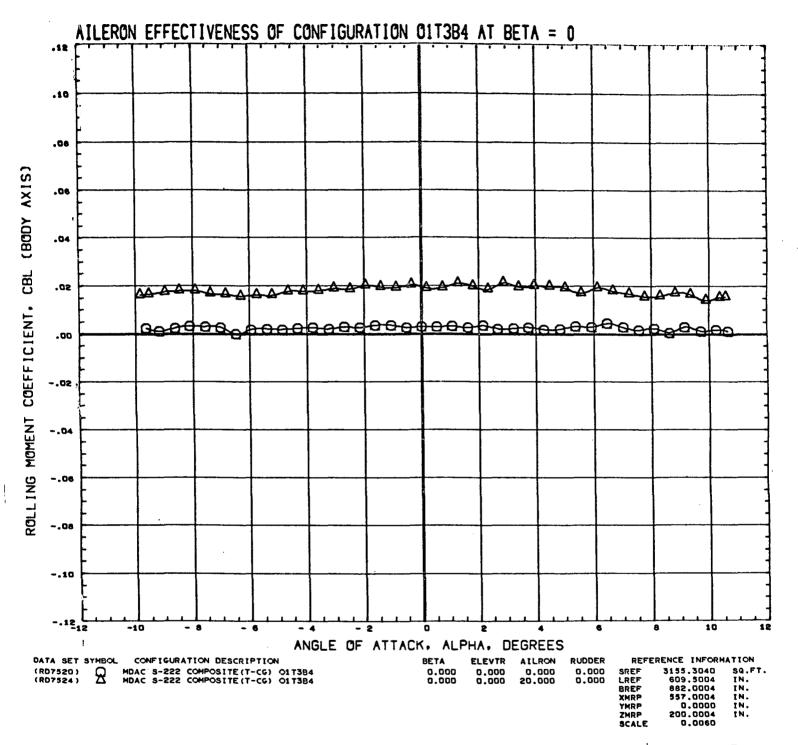


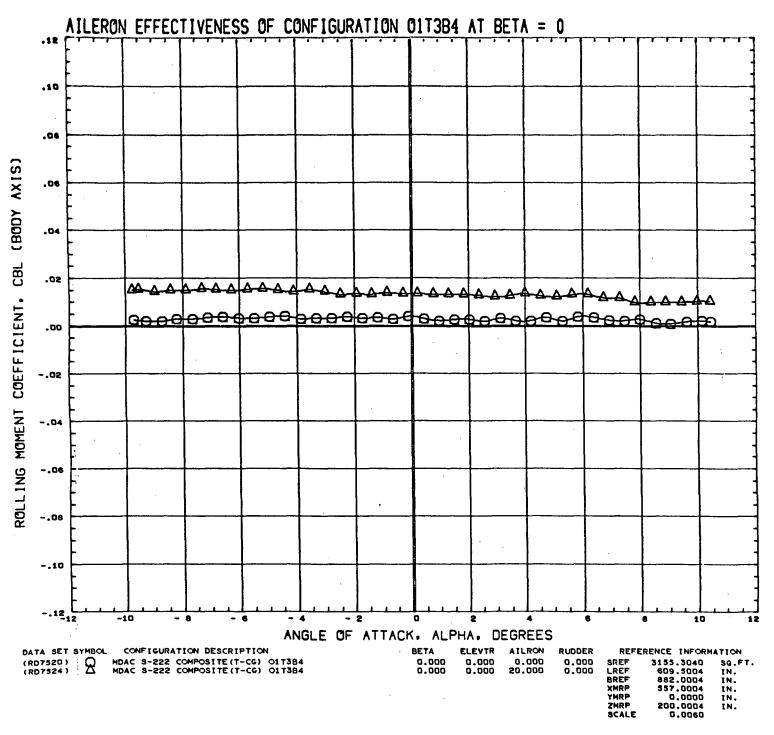
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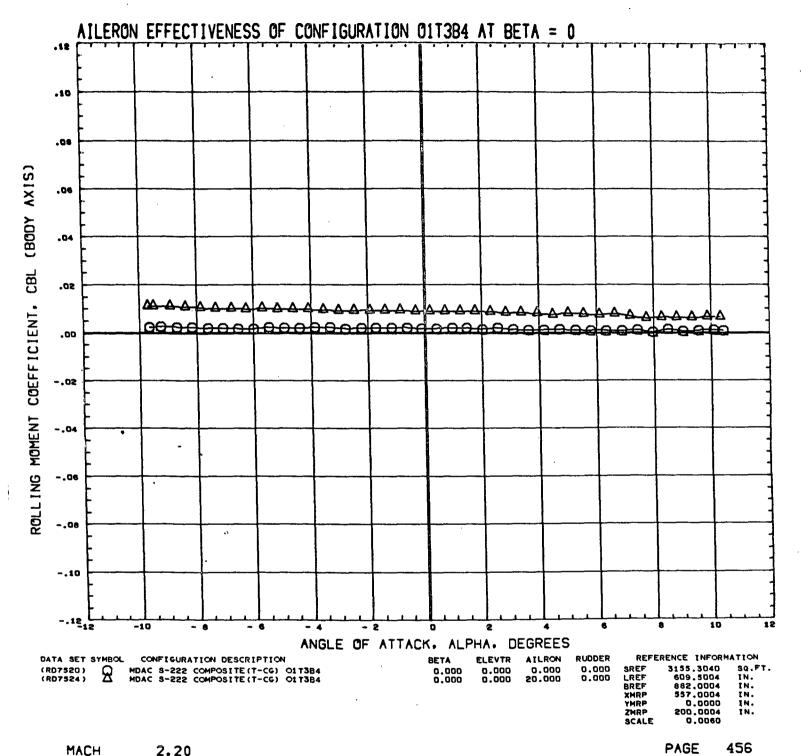


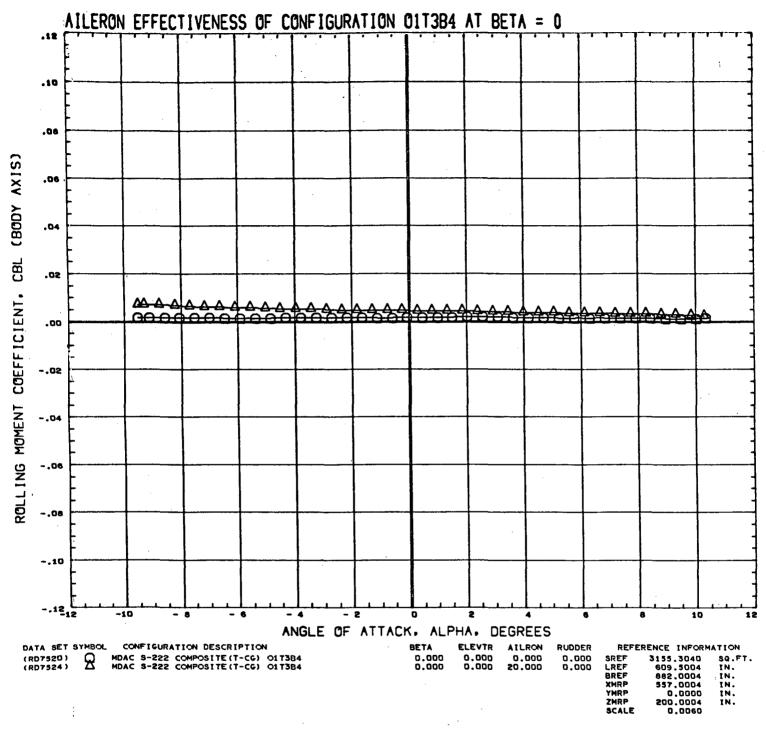
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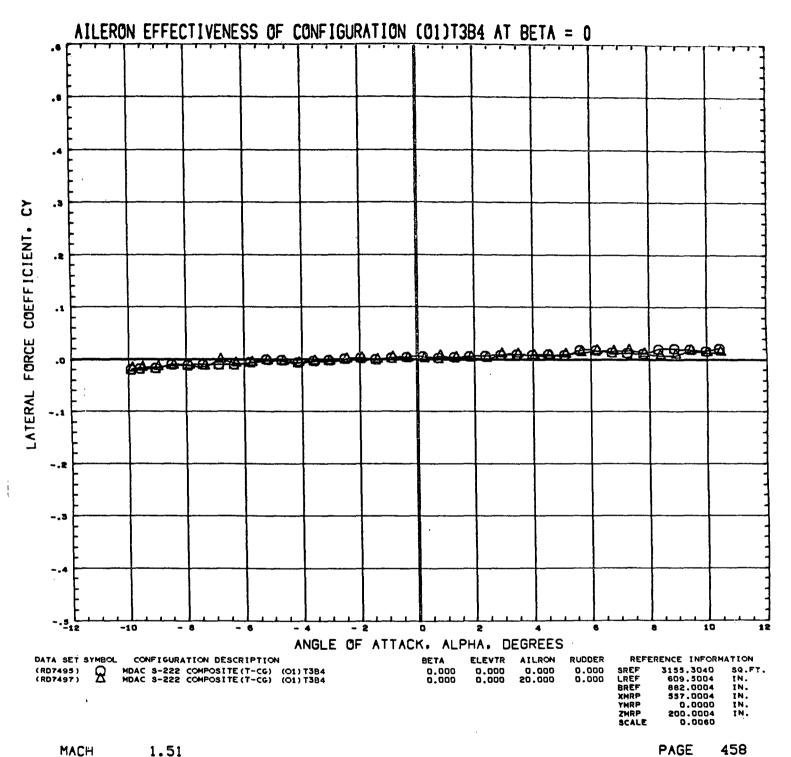


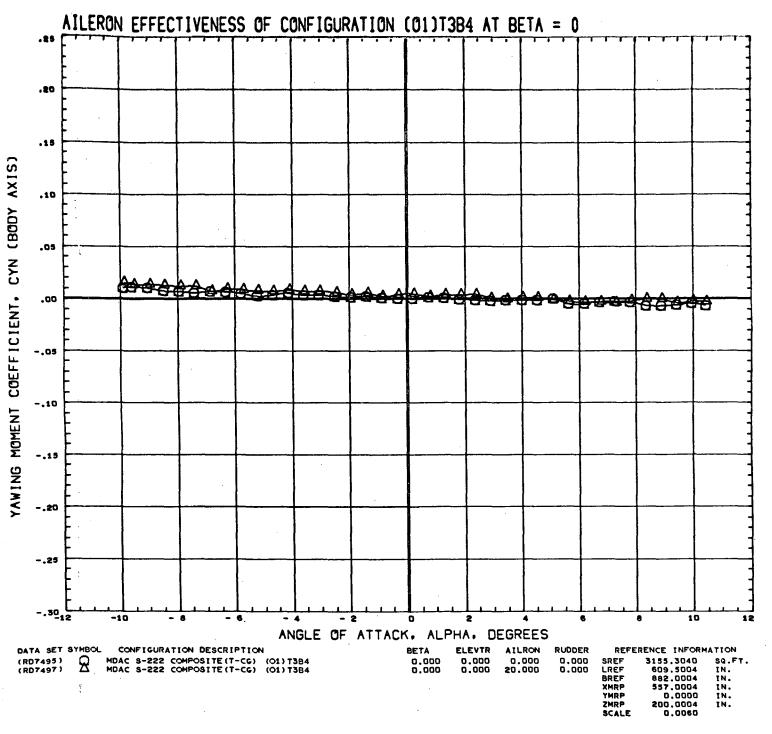


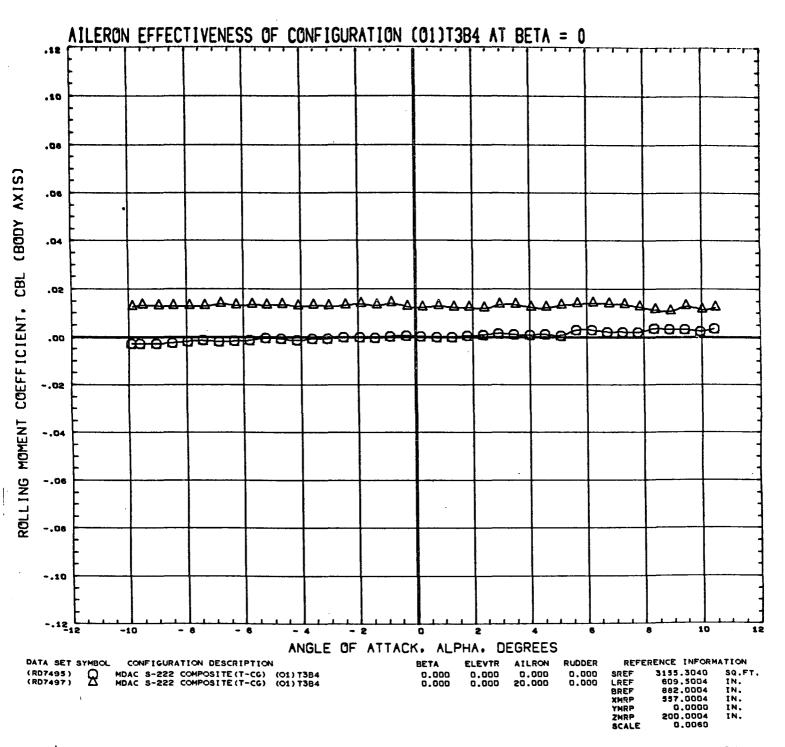




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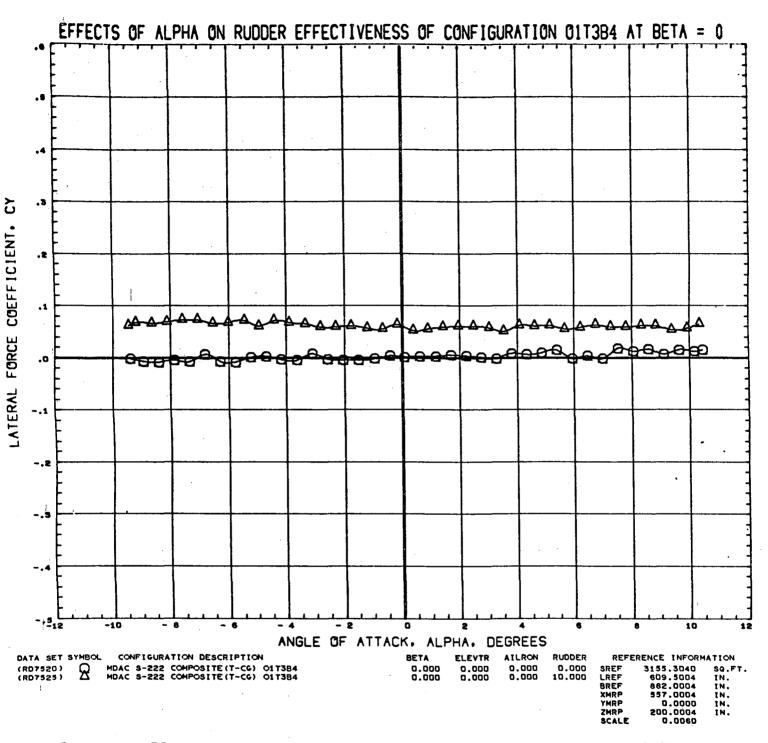


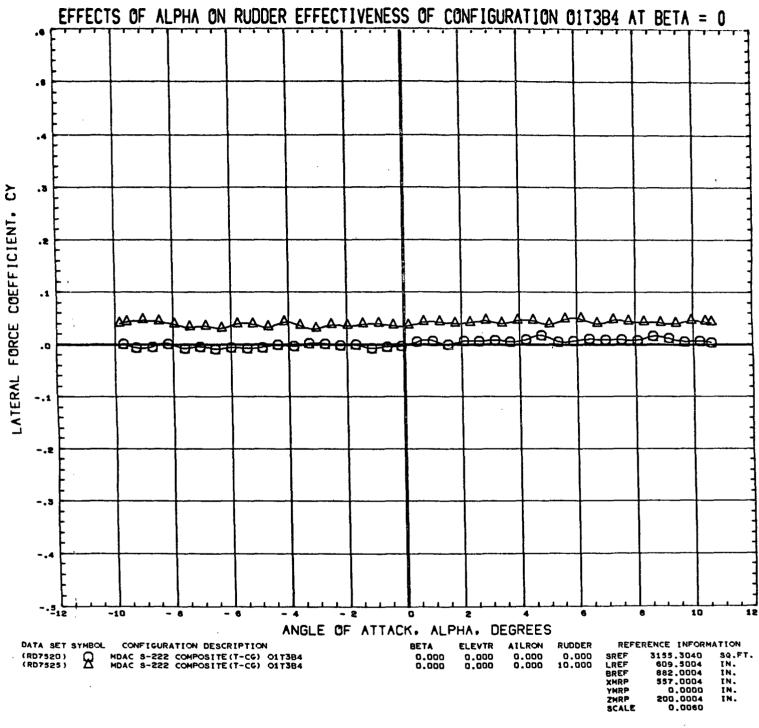




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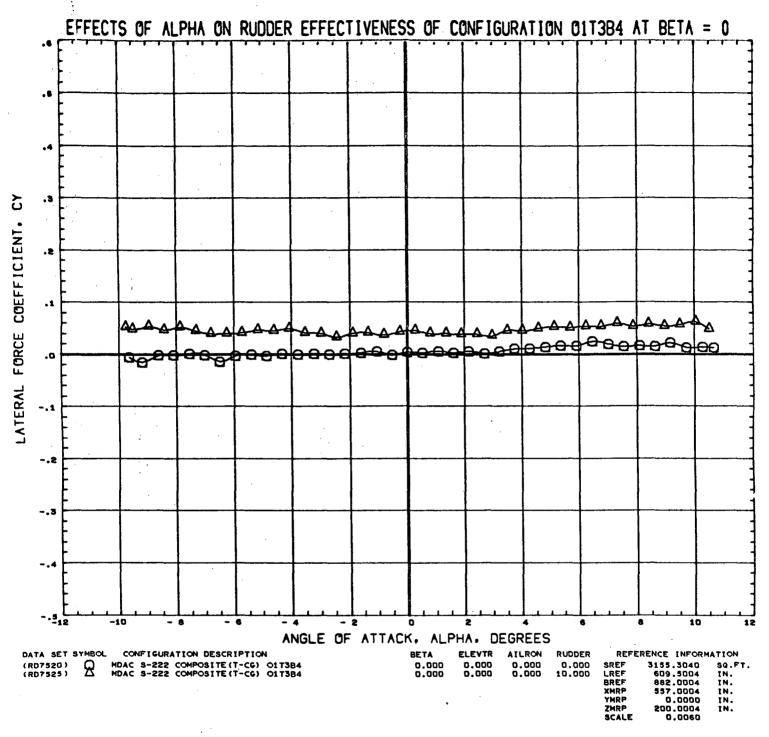
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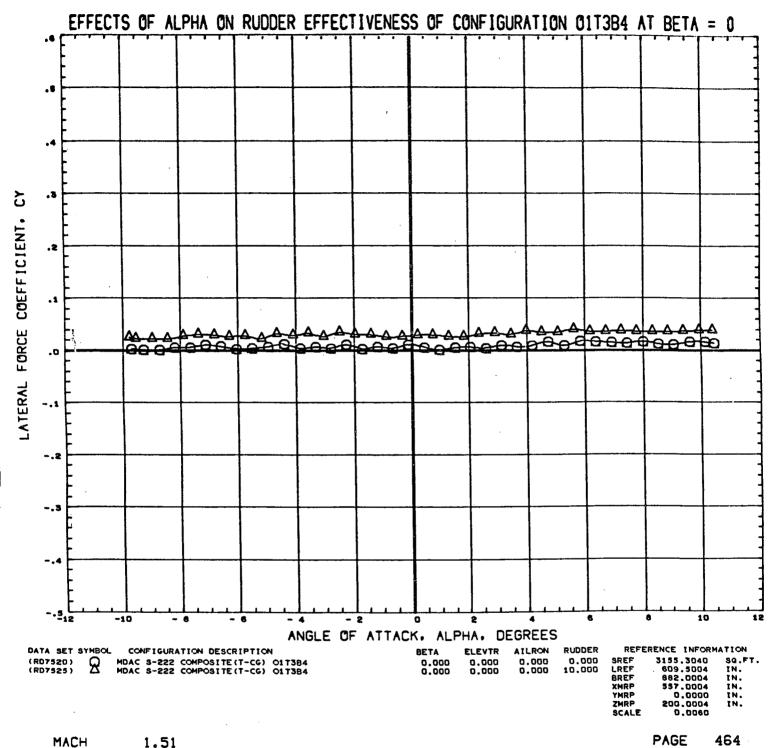
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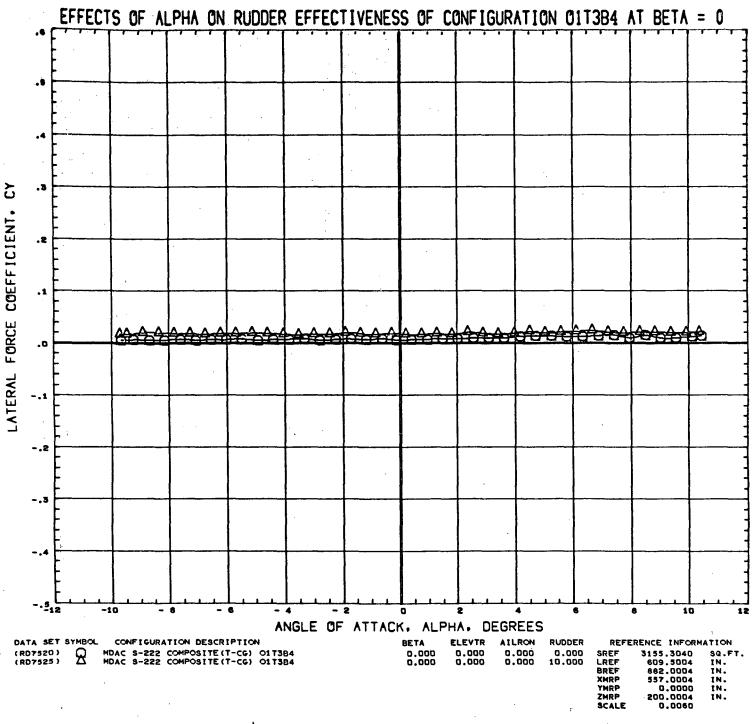
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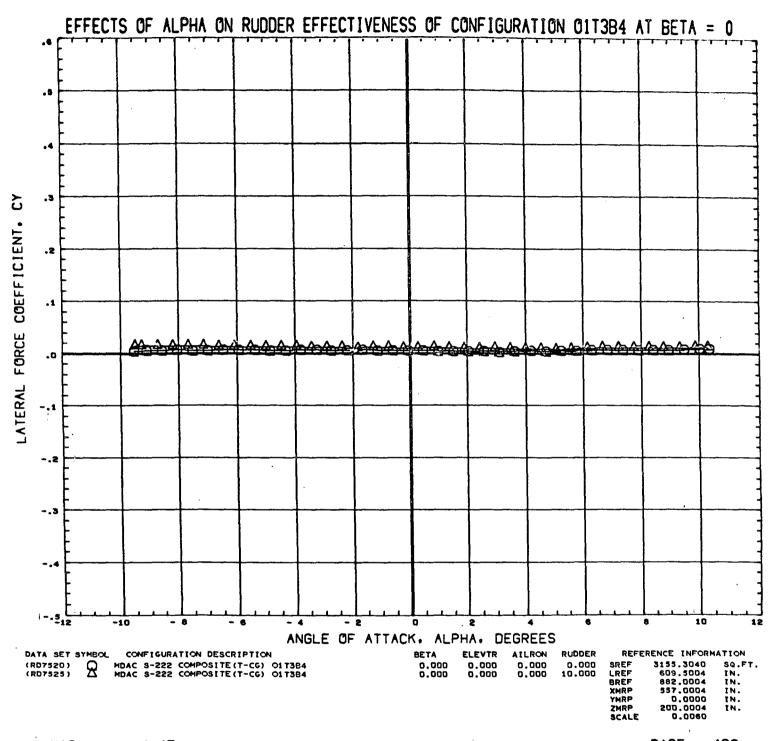
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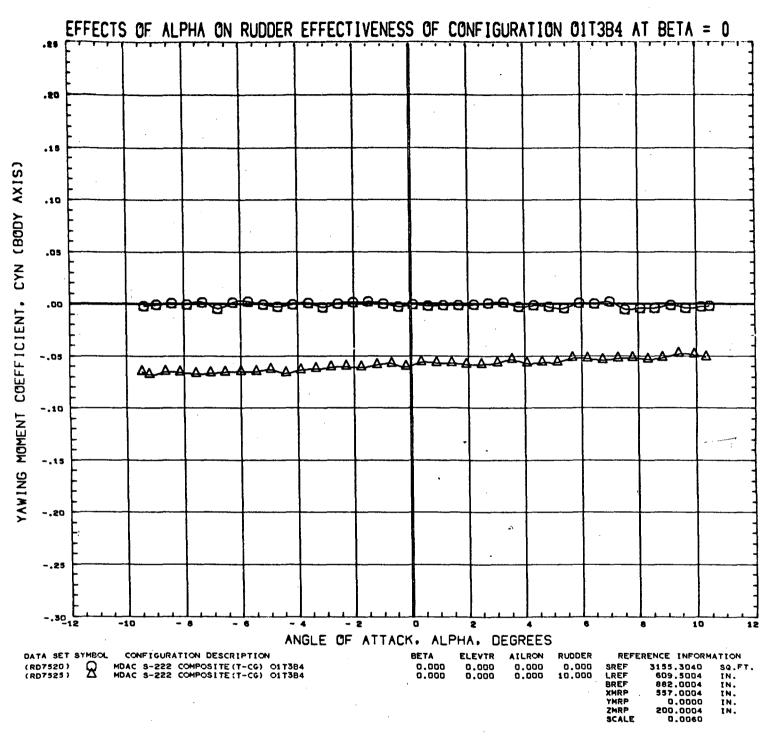




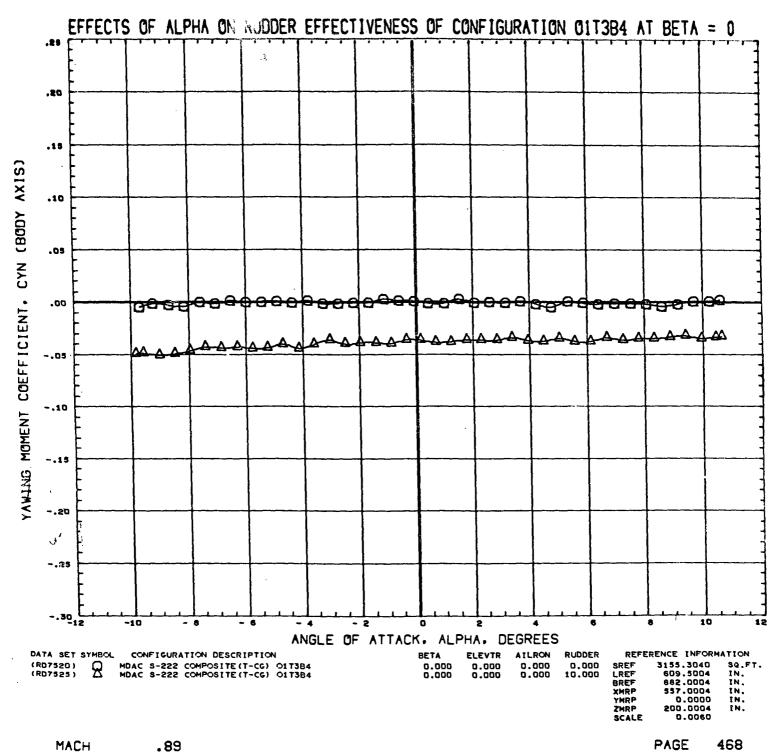
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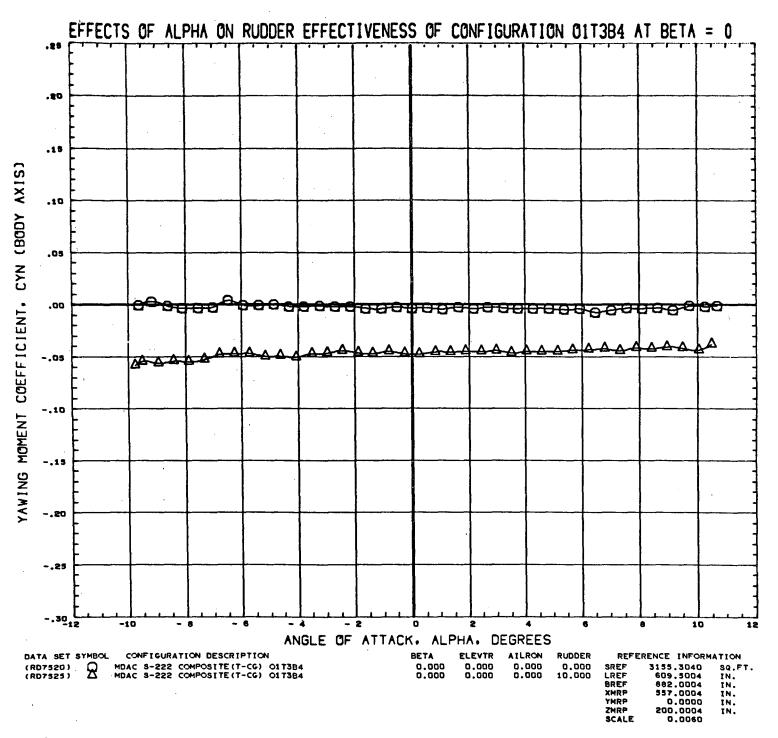


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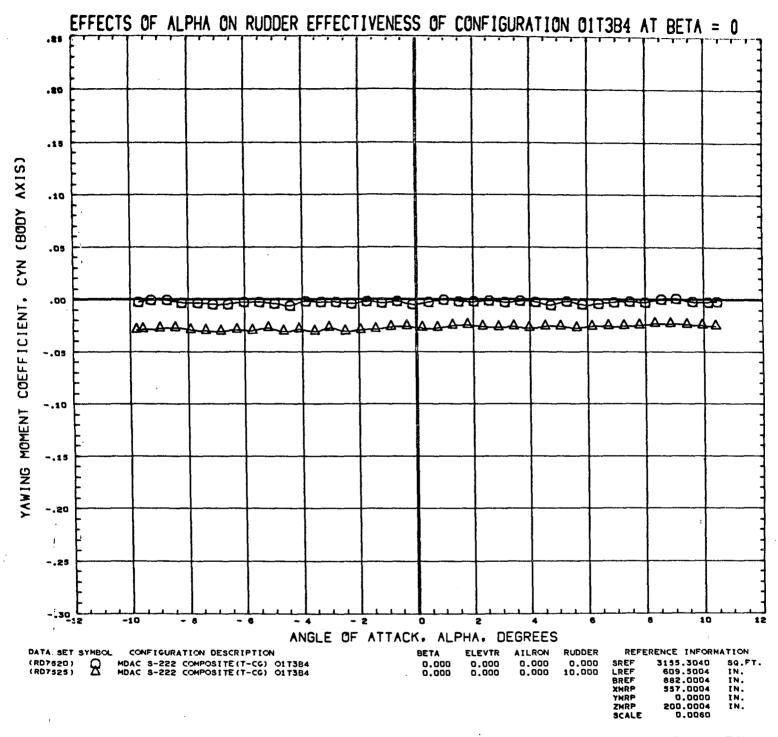


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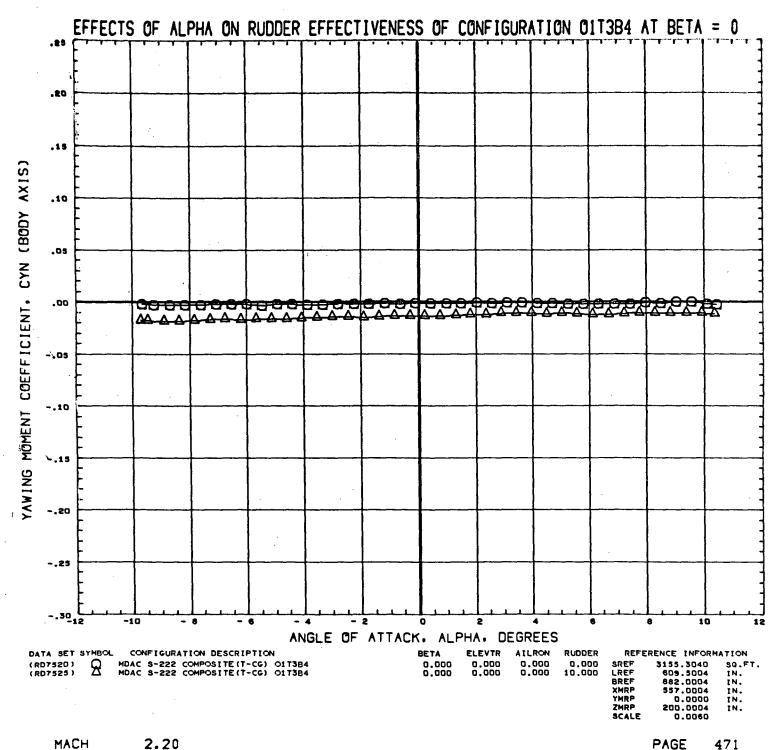




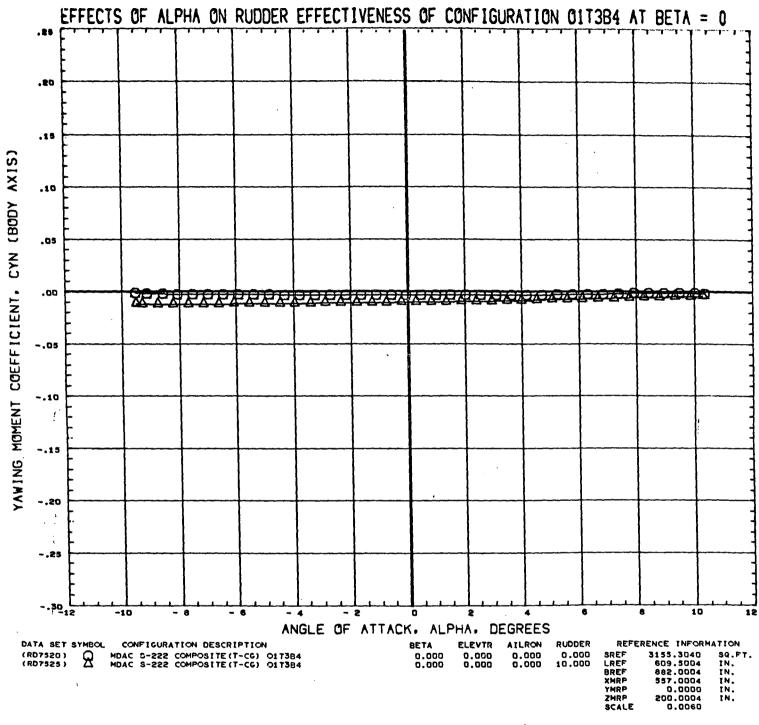
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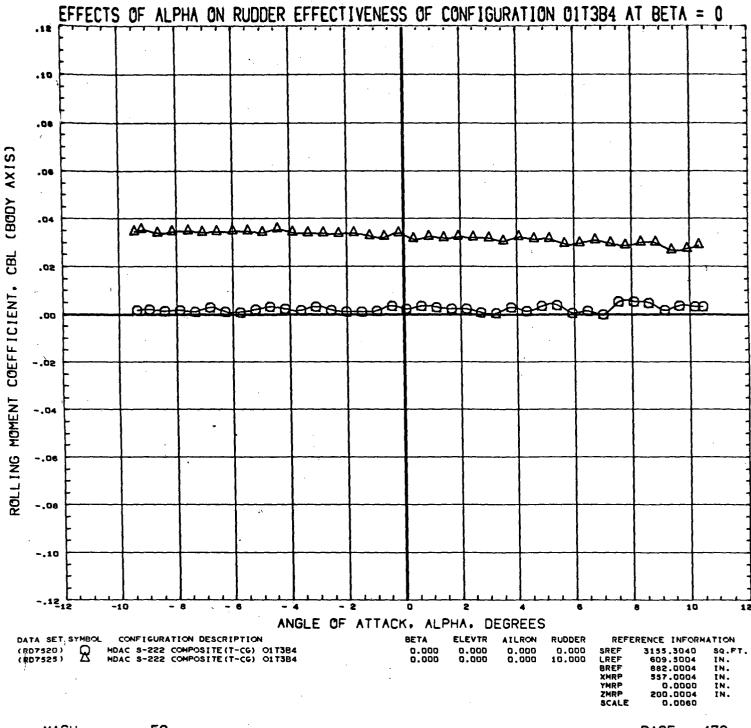
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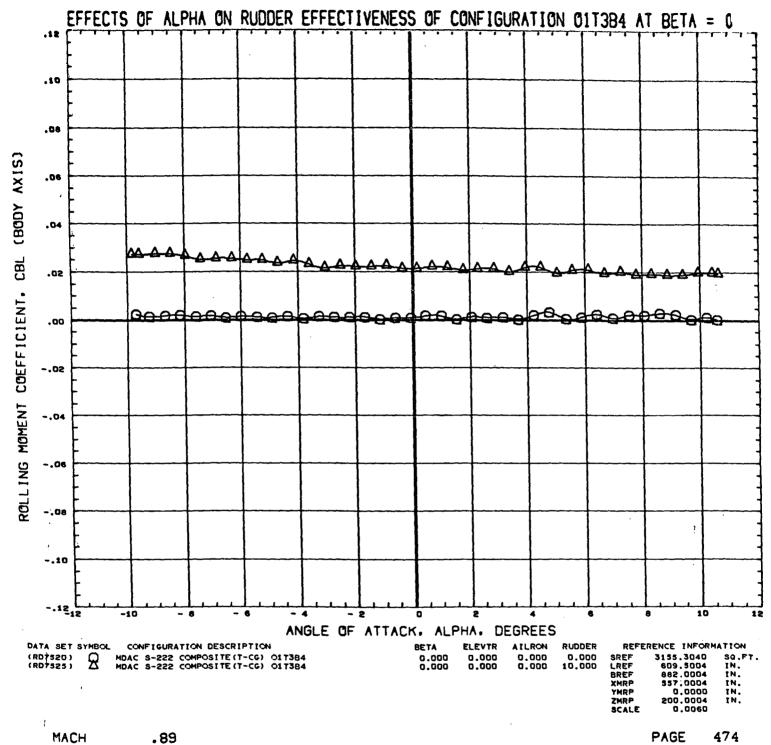
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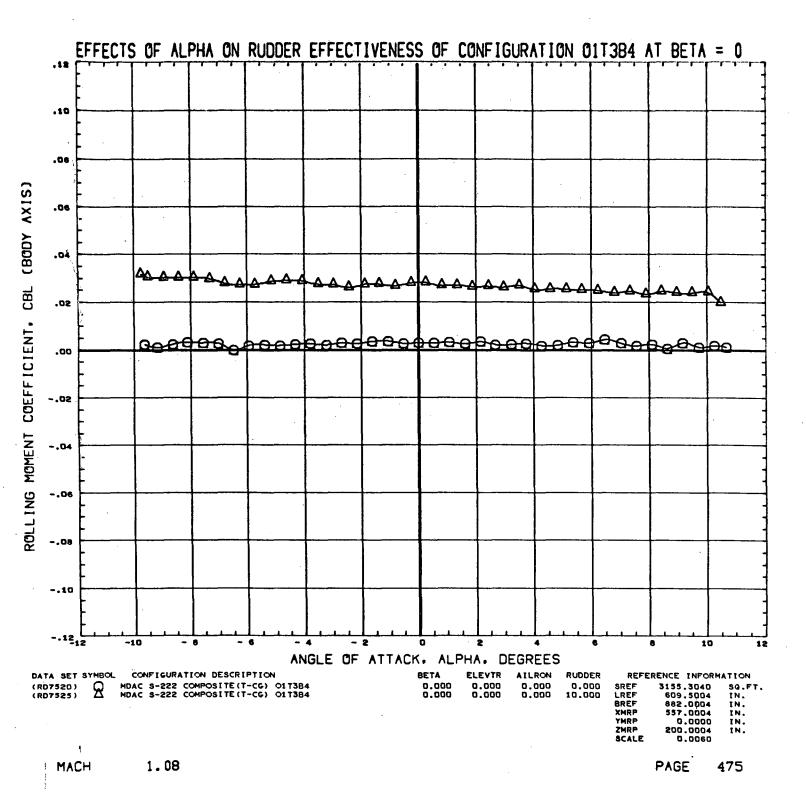


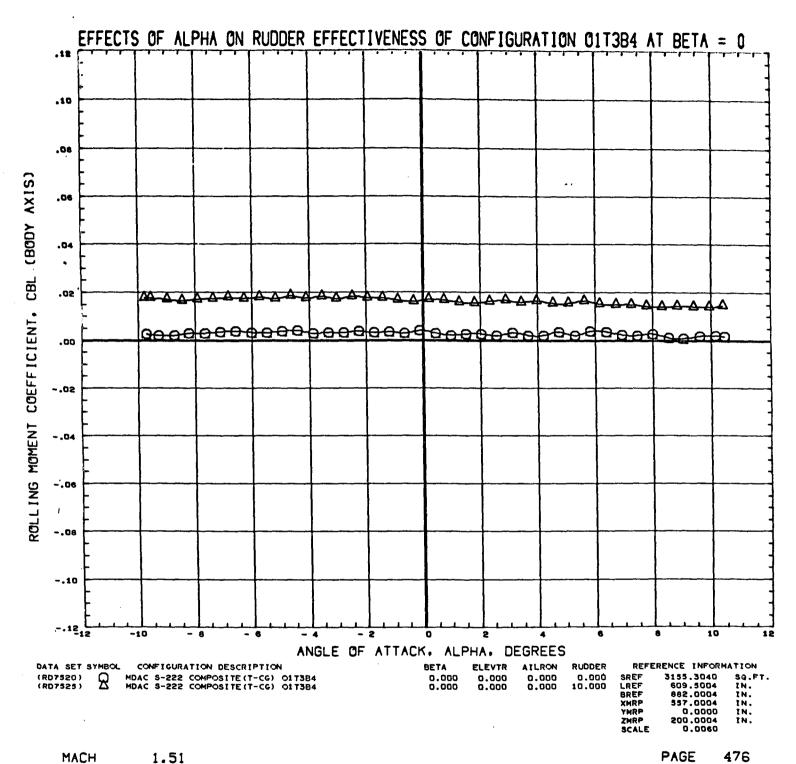
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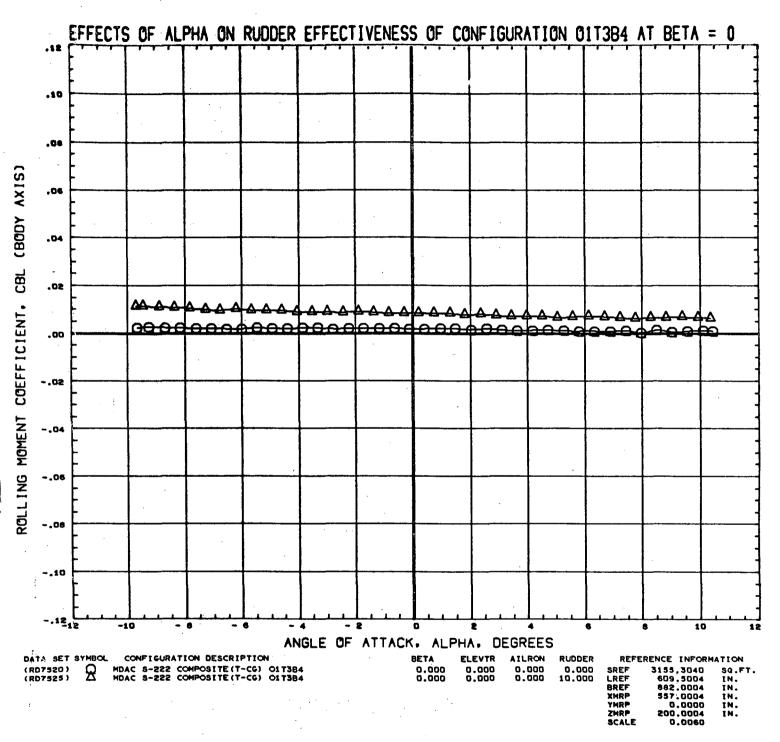


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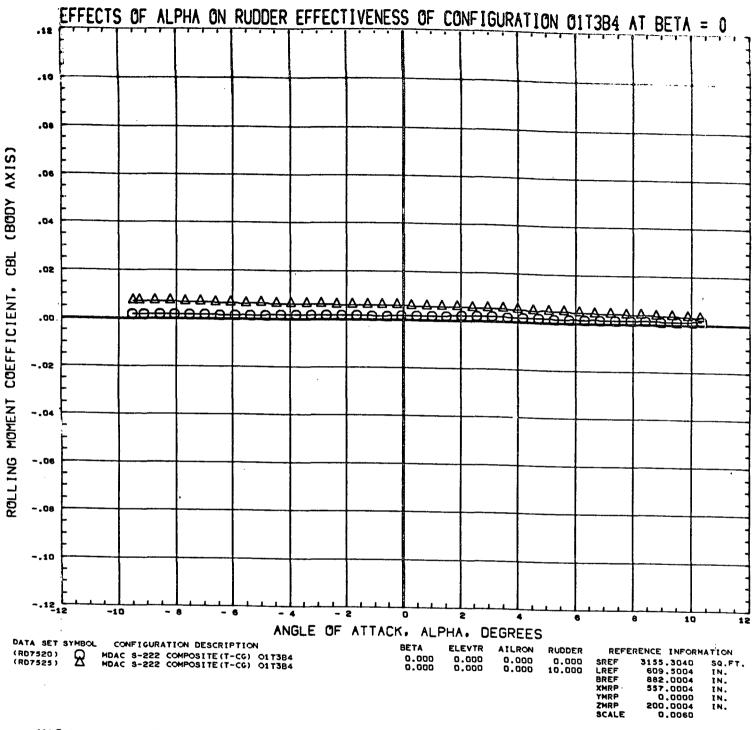




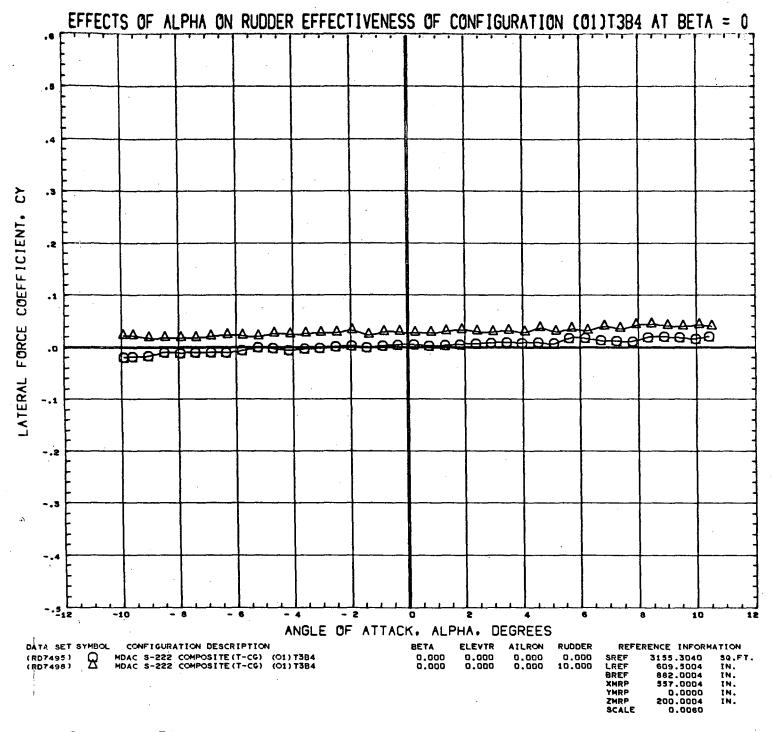




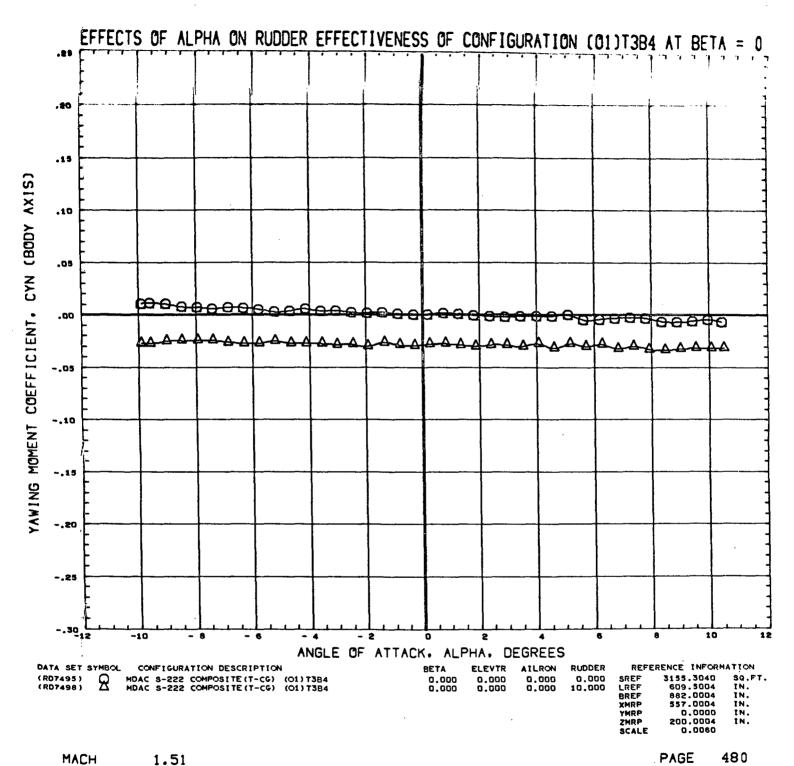
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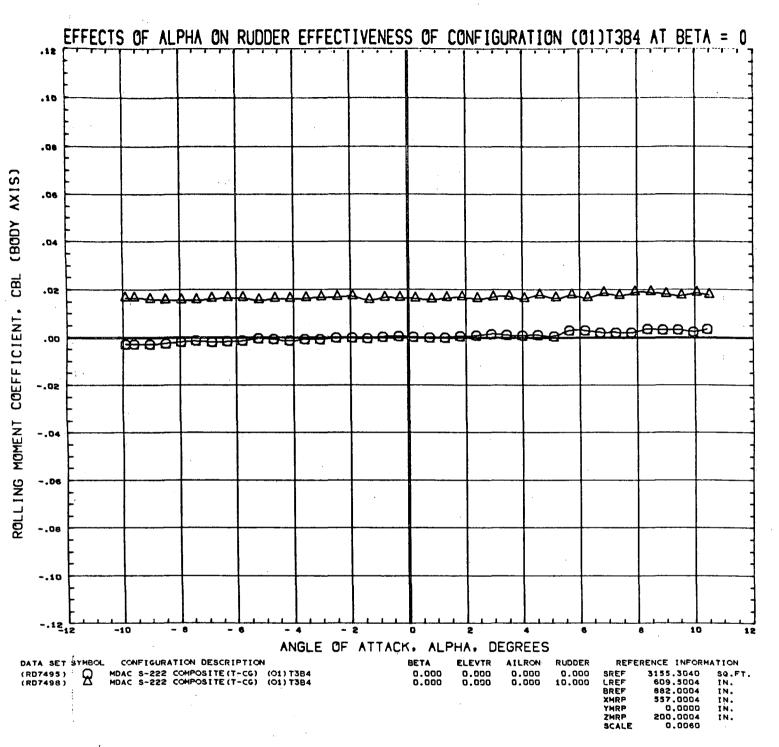


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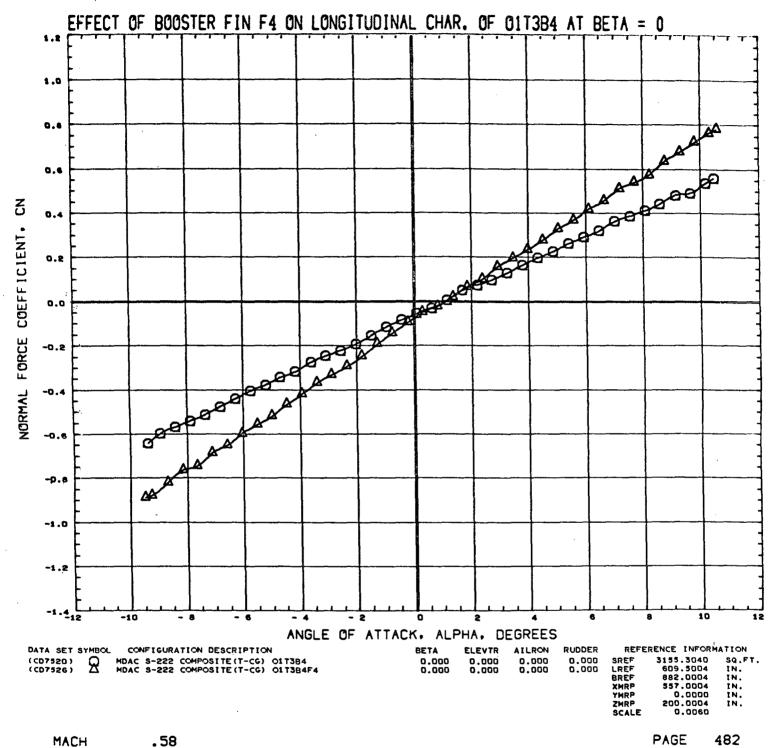


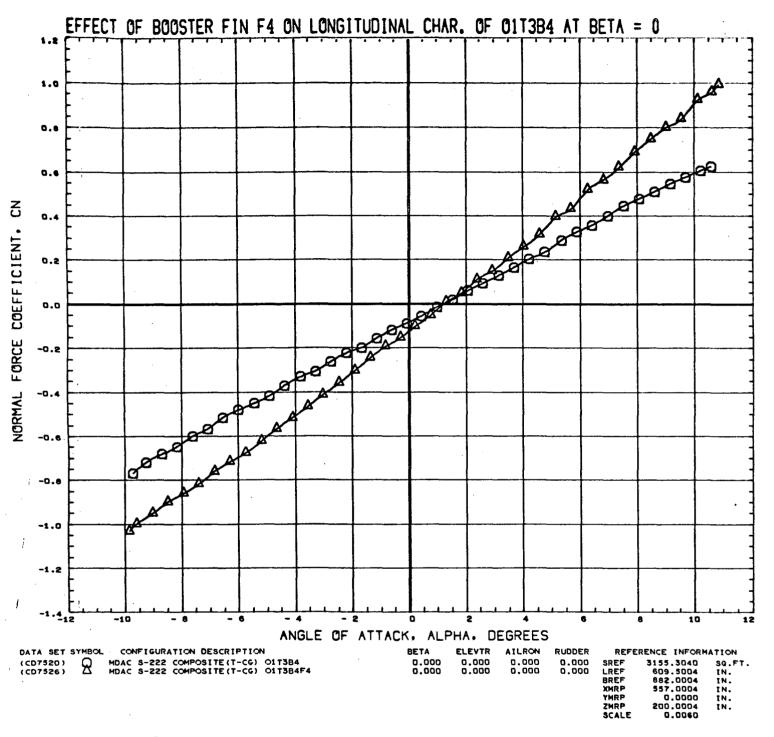
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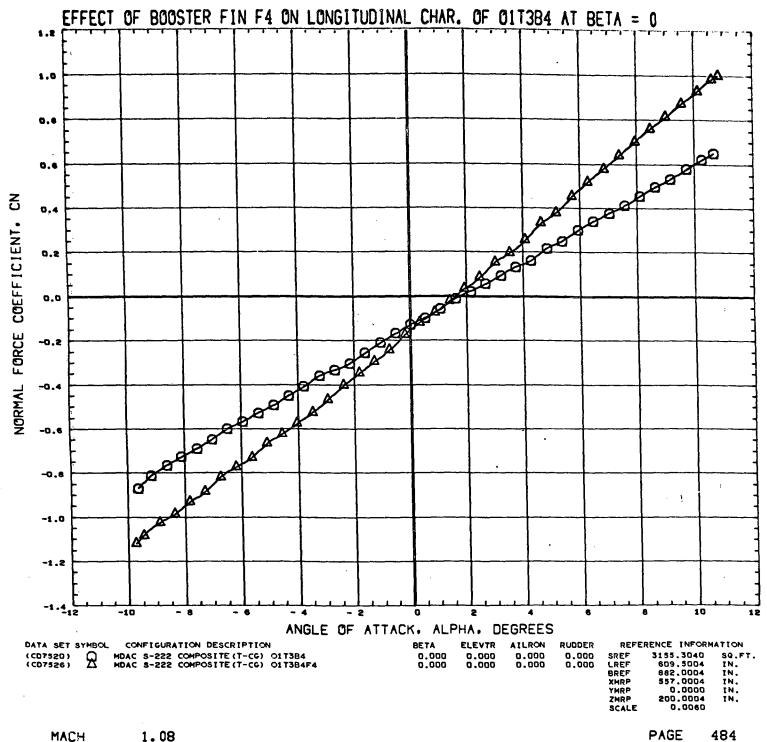


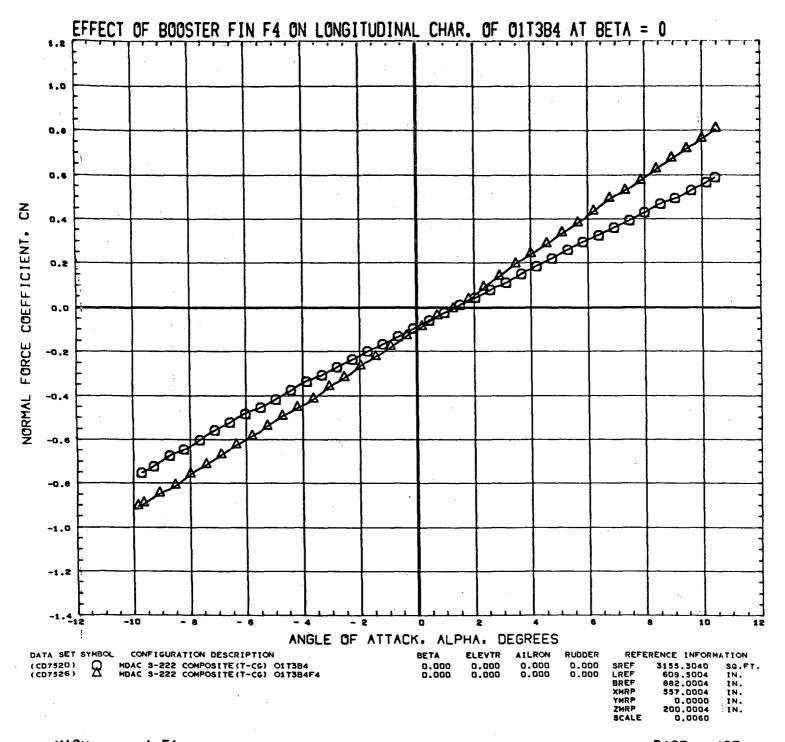
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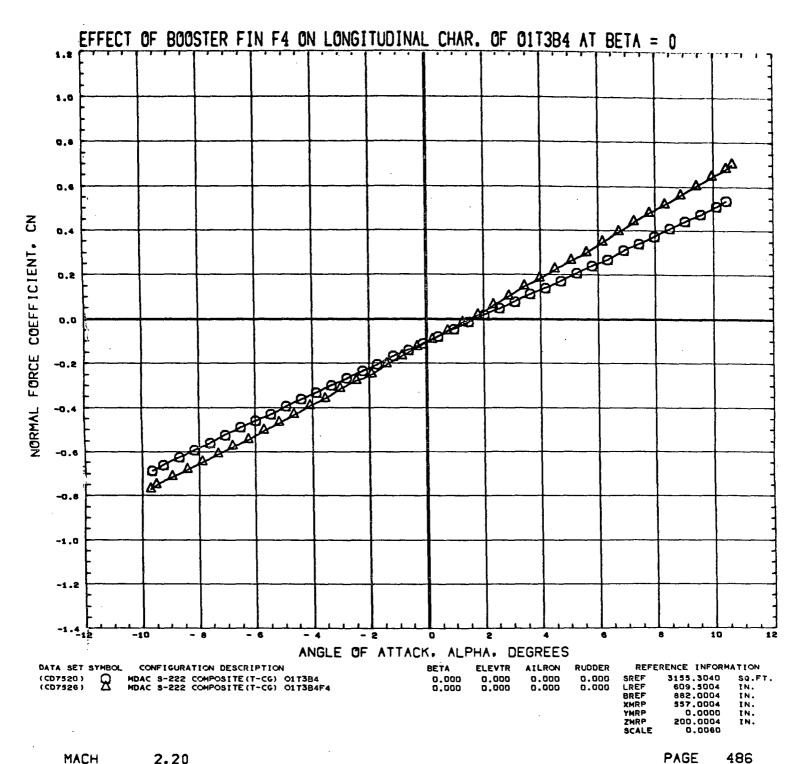


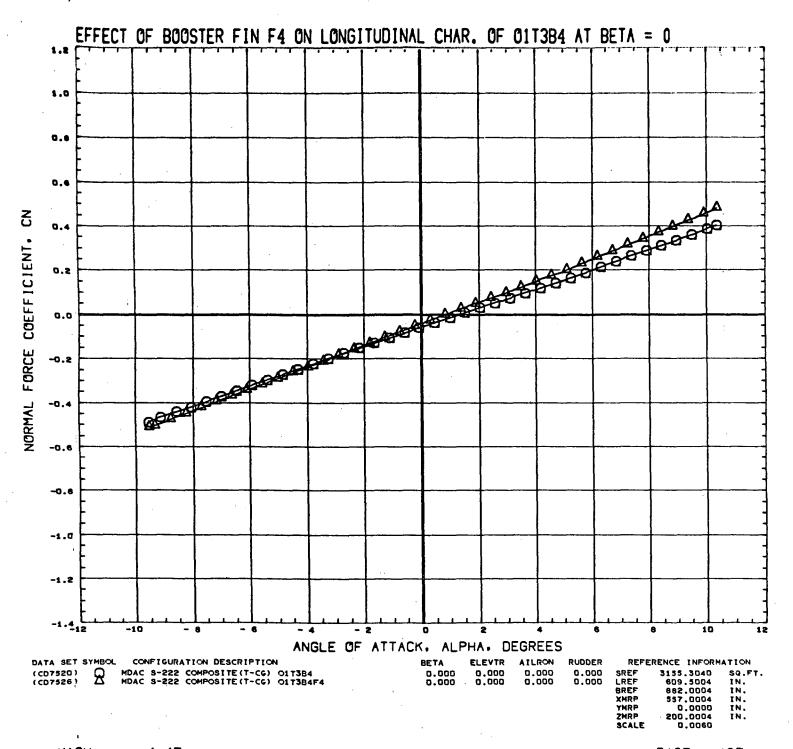
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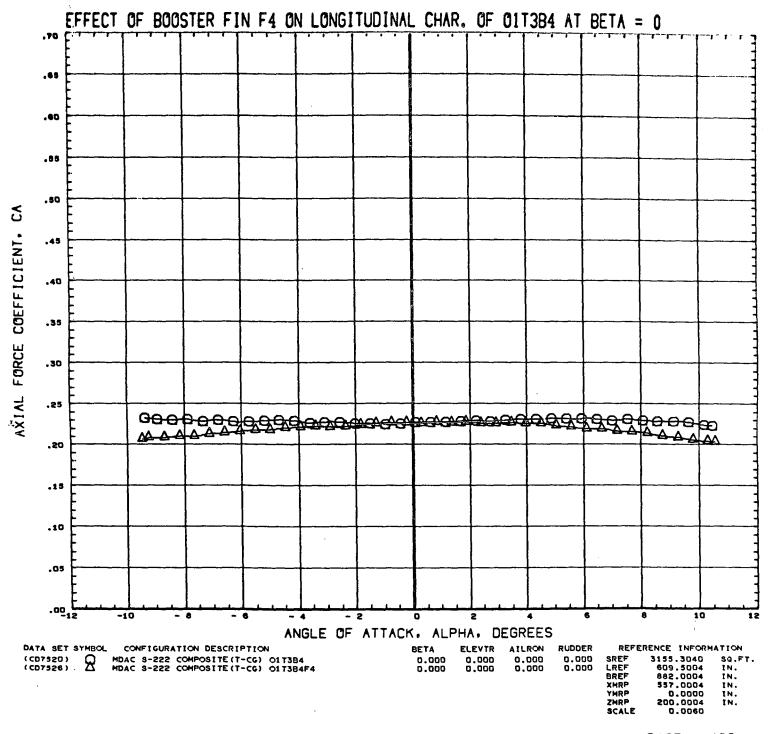


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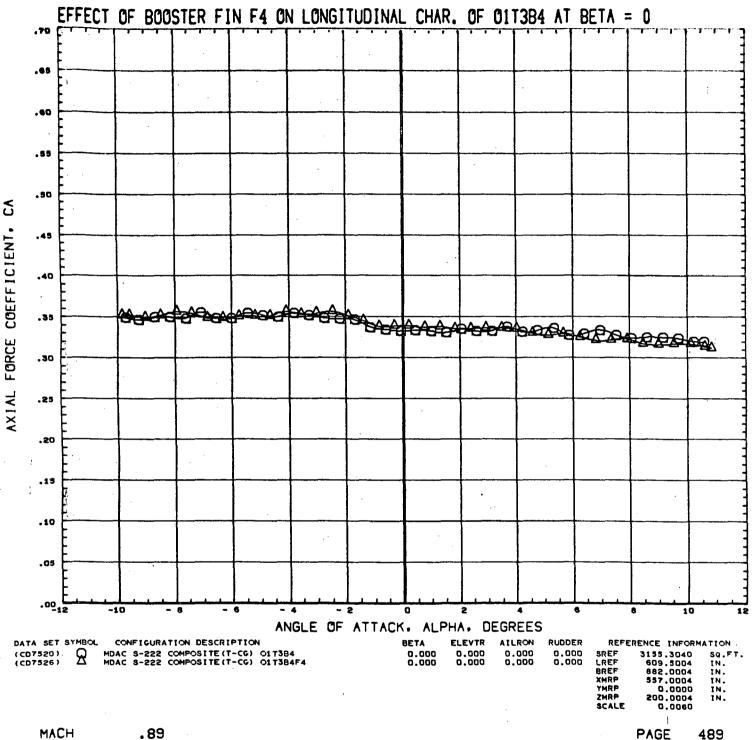




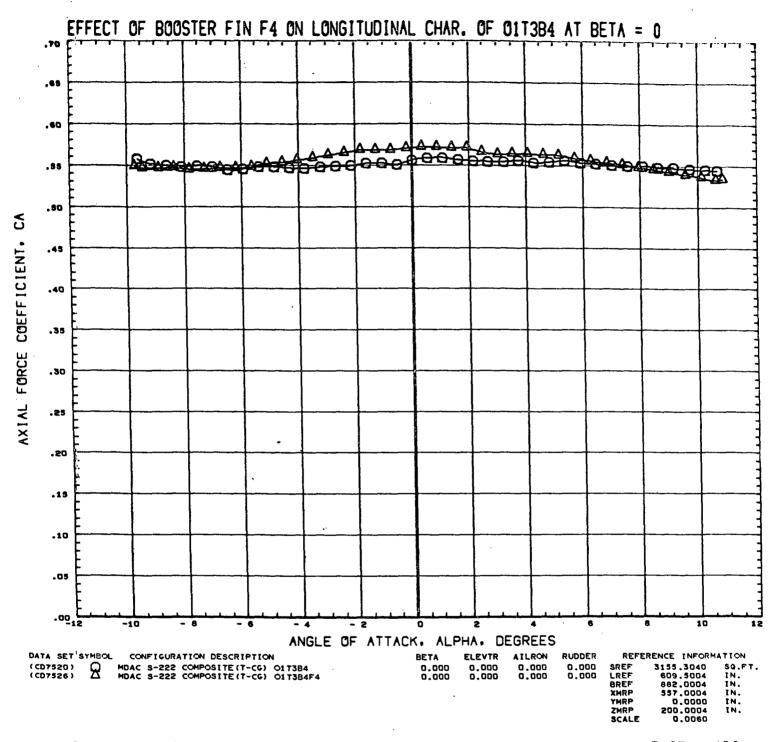
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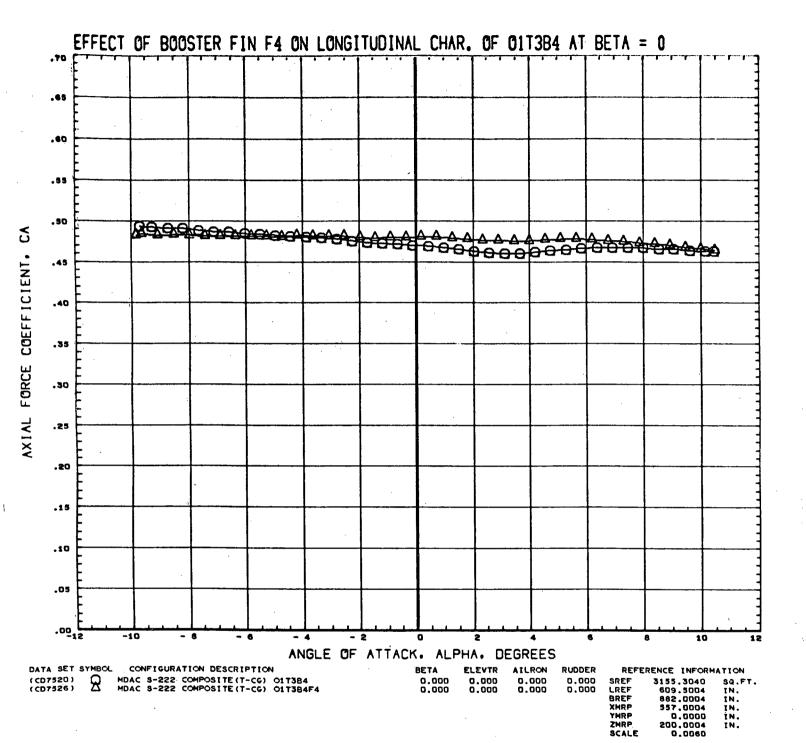
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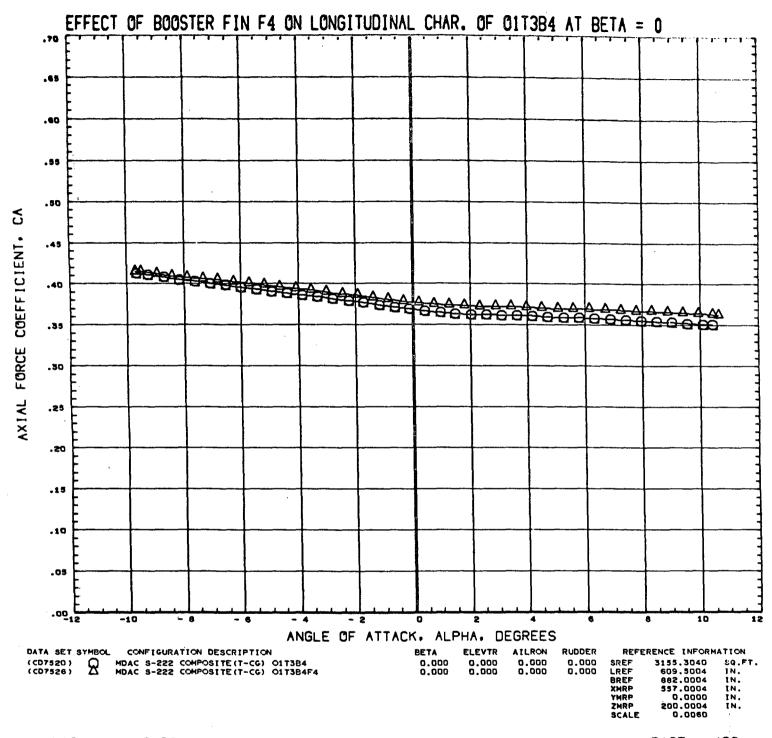
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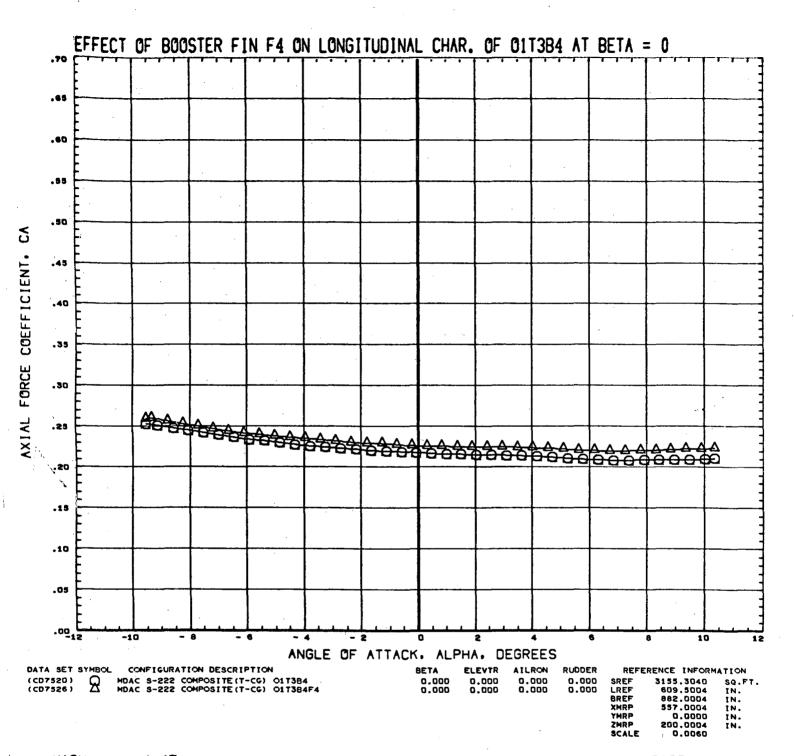
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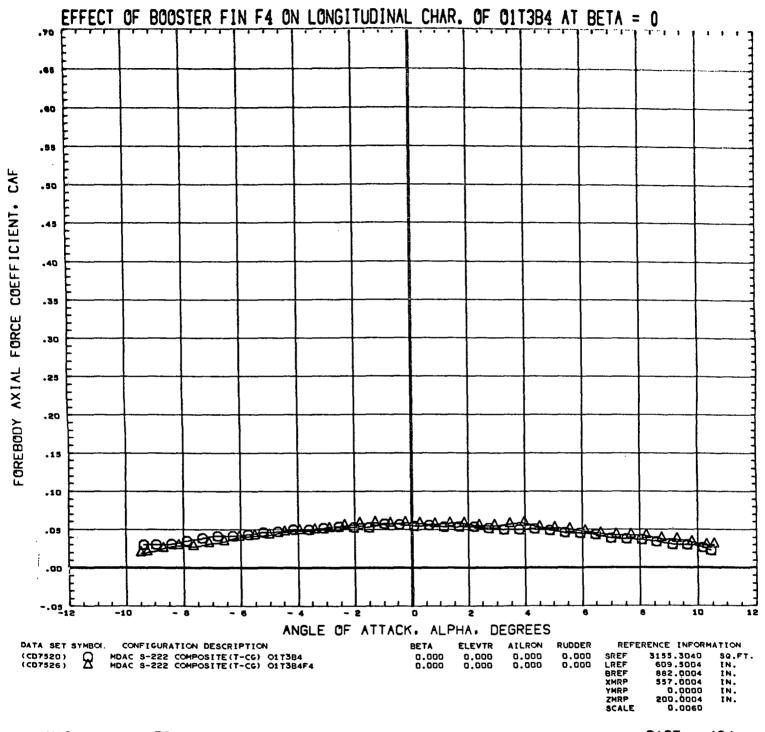
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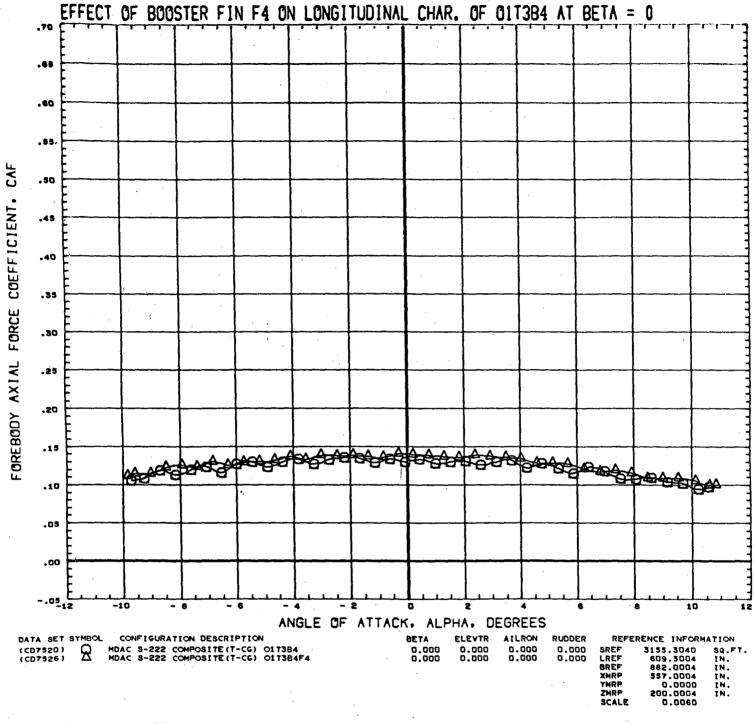
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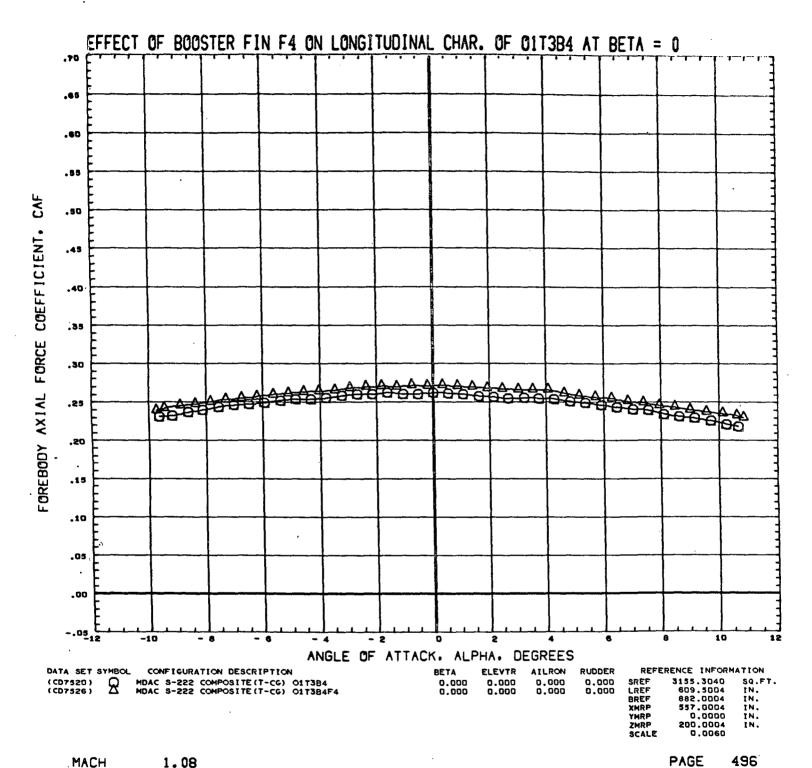


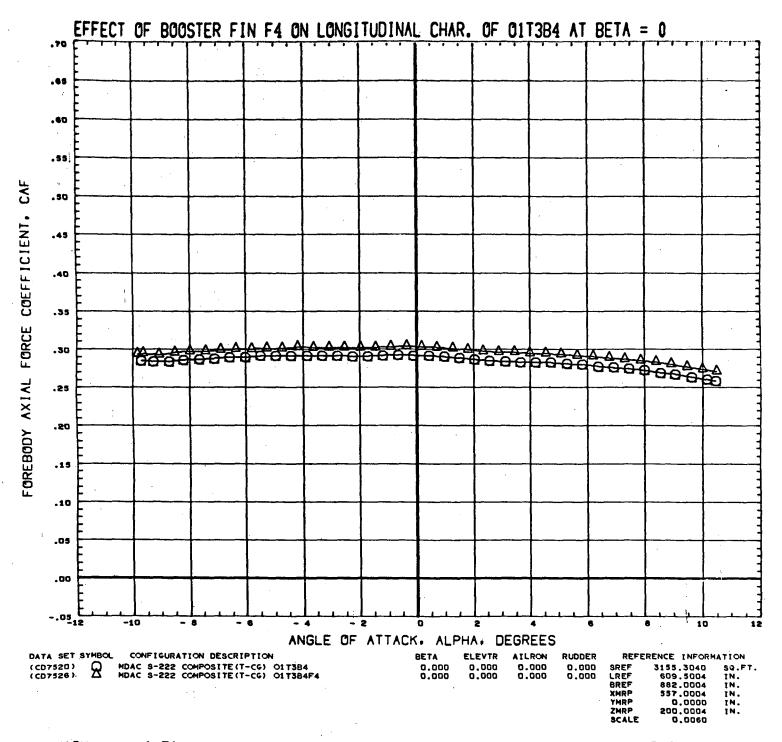
MACH .58



MACH .89

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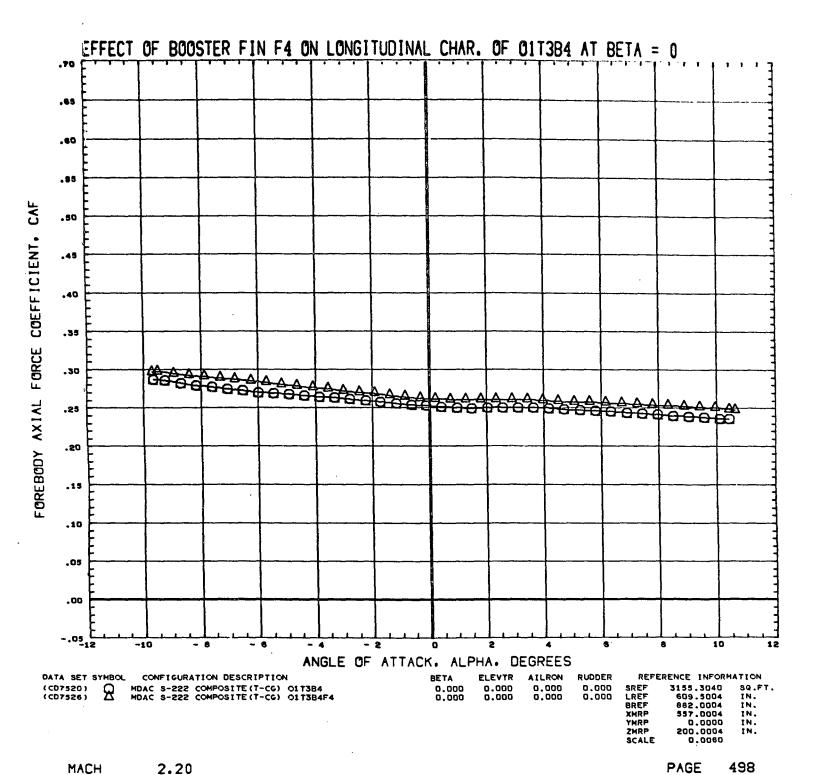


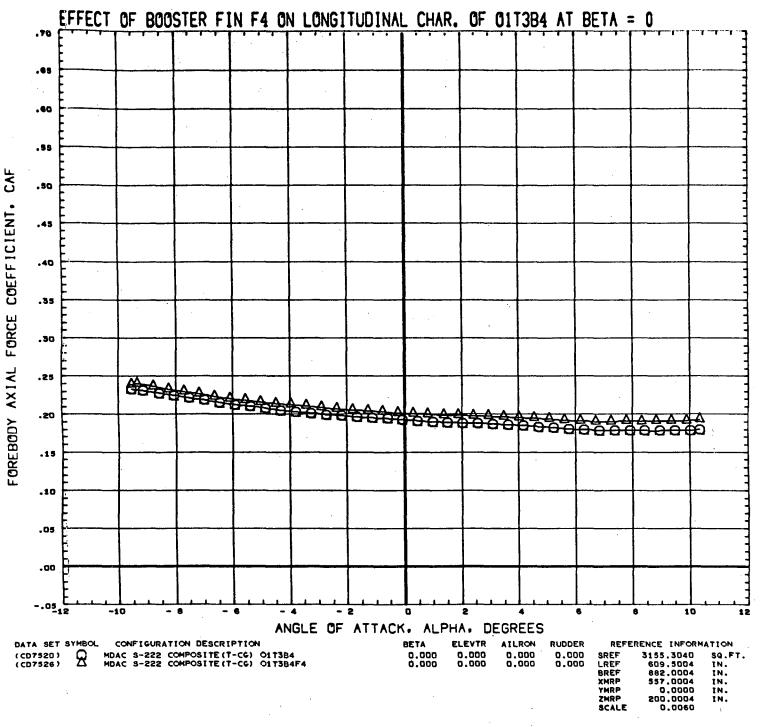


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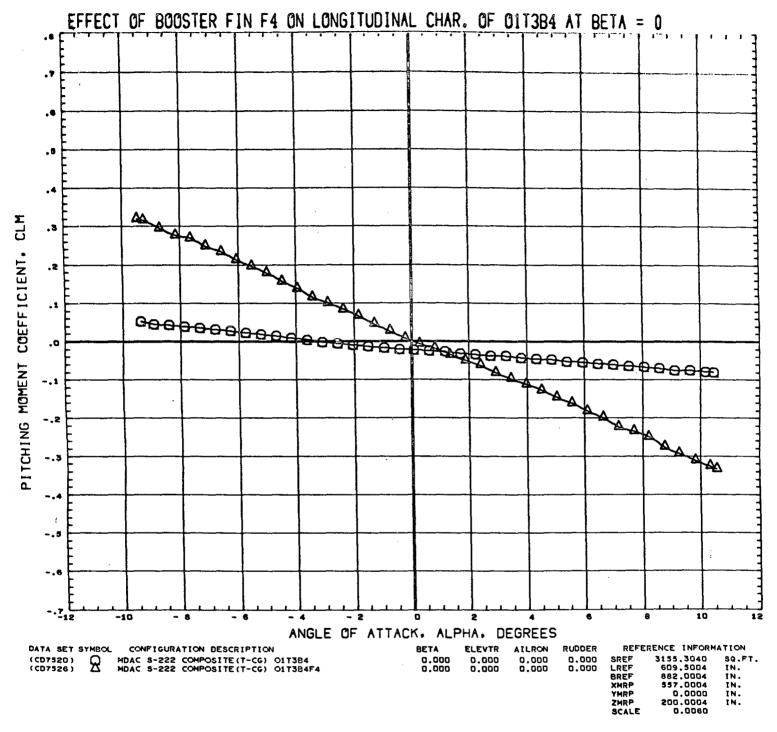
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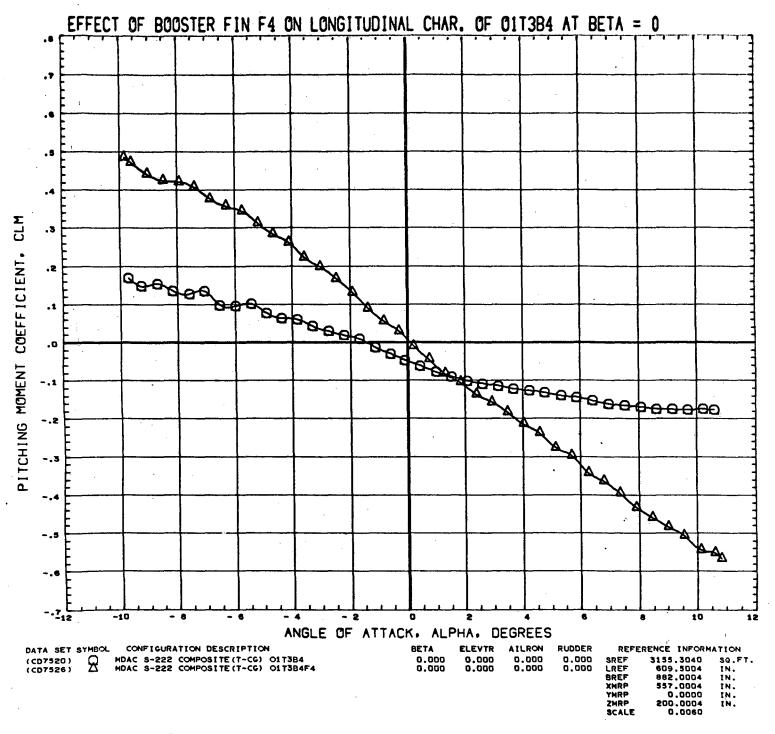


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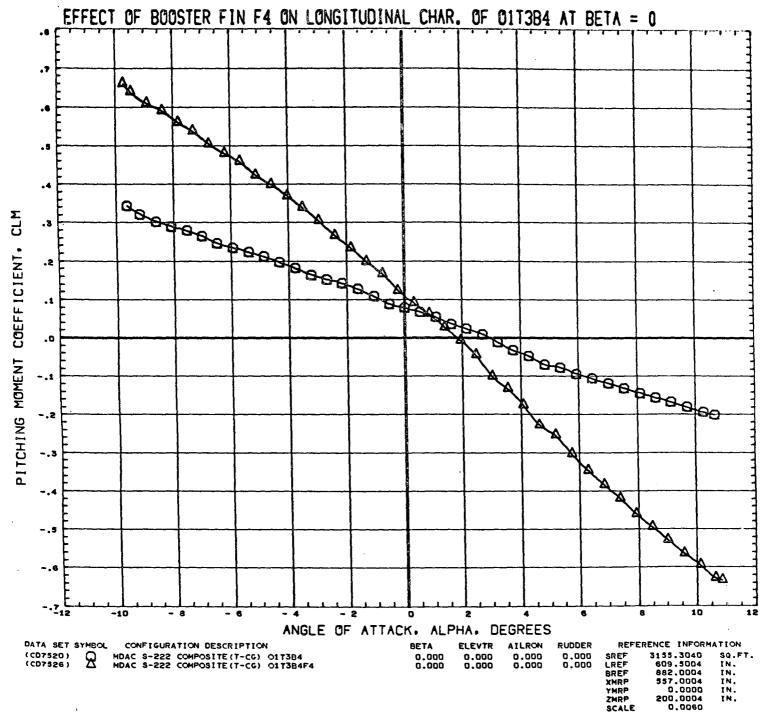


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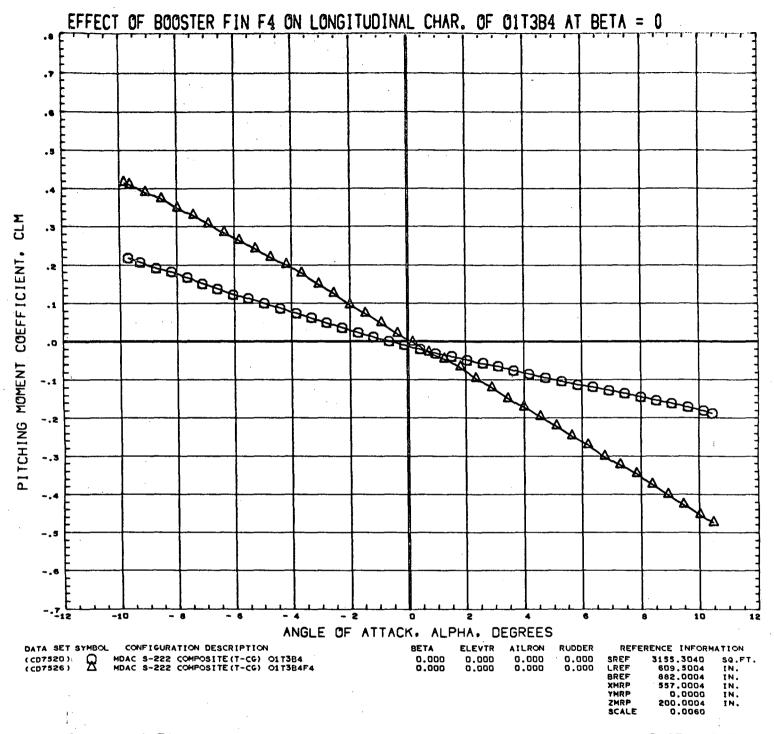


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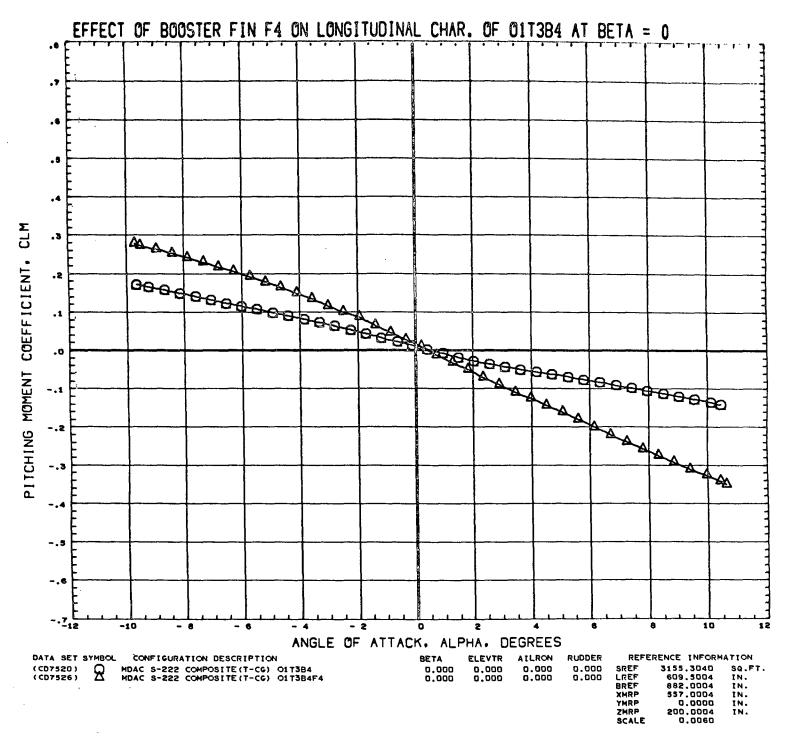


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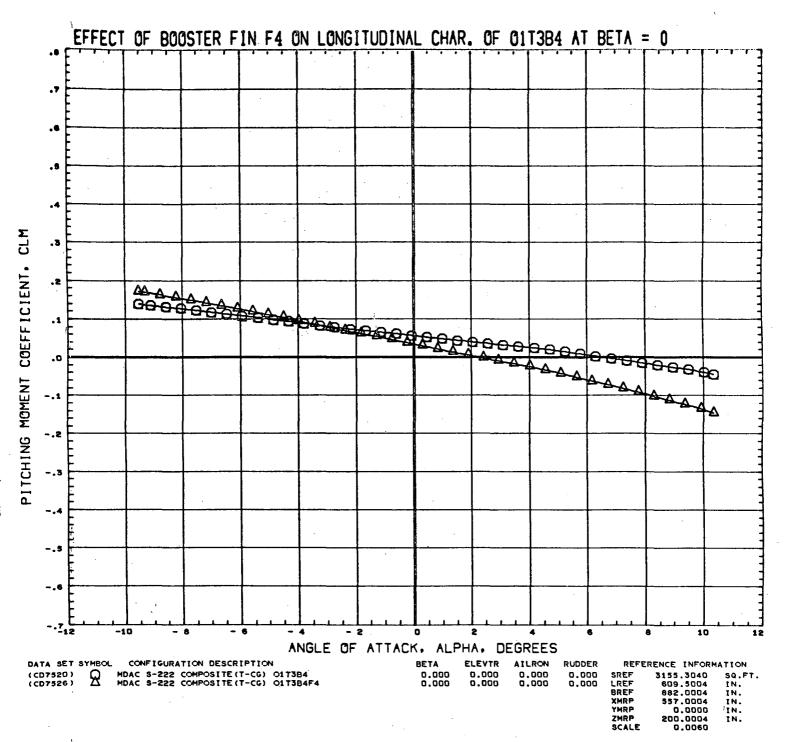
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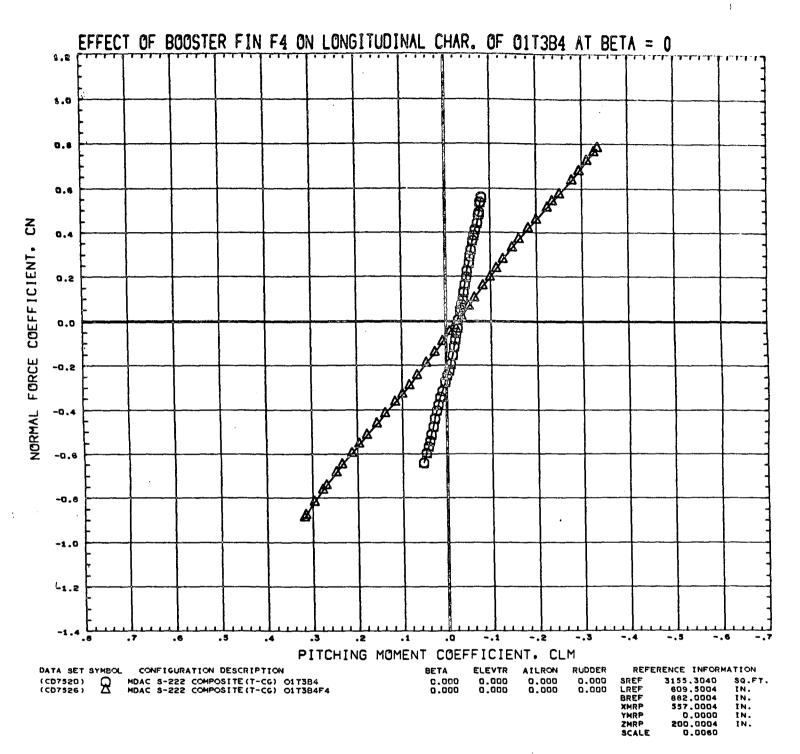
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MACH 2.20

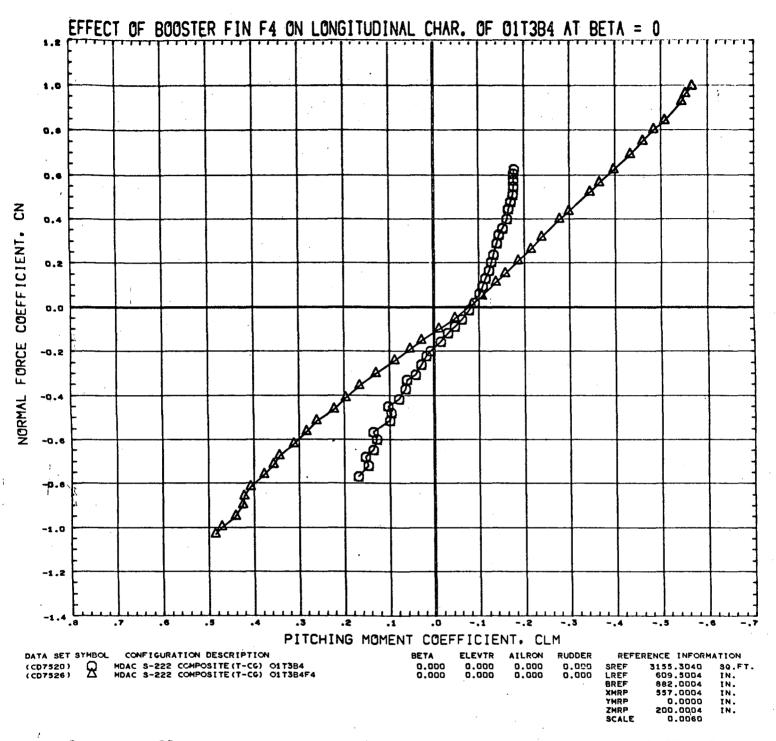


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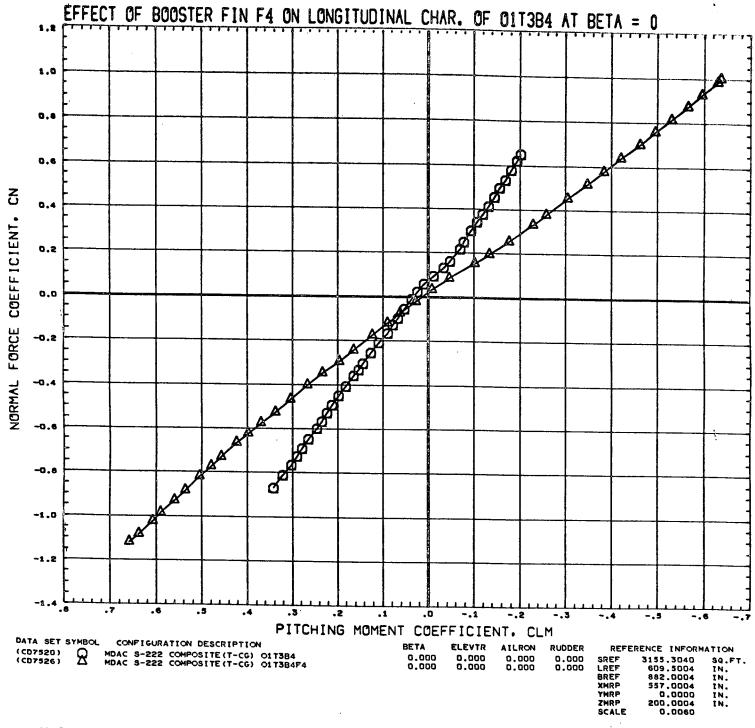


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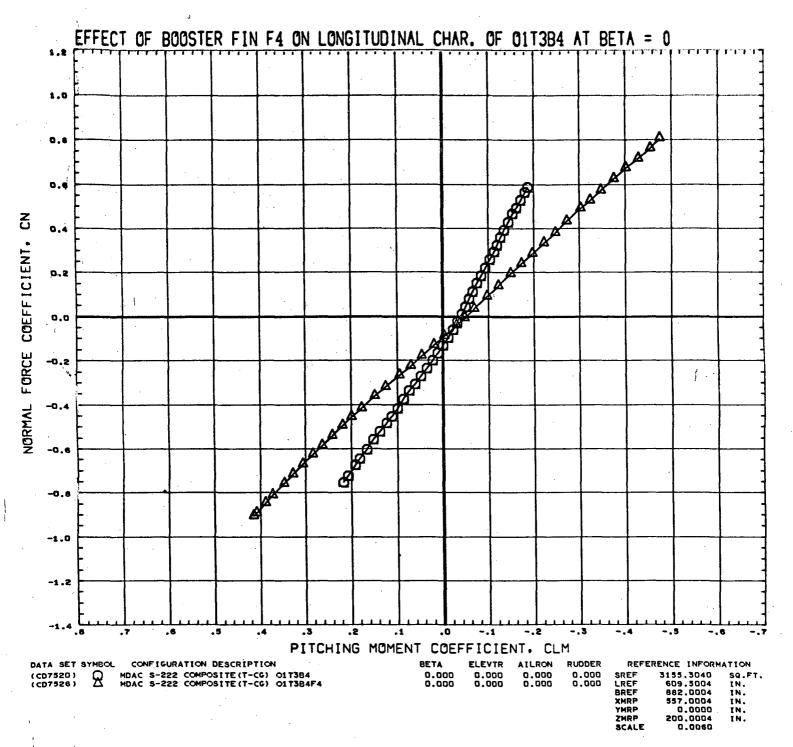
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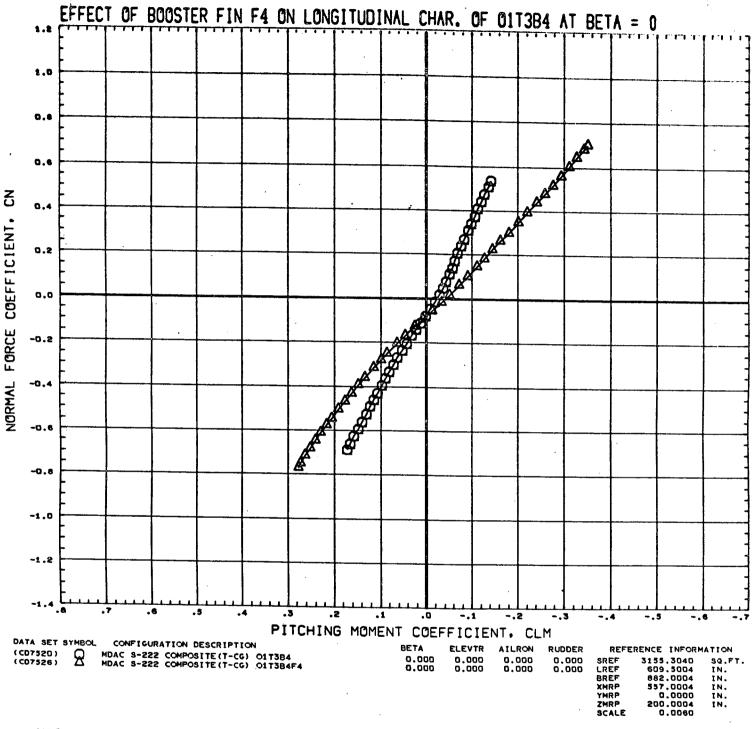


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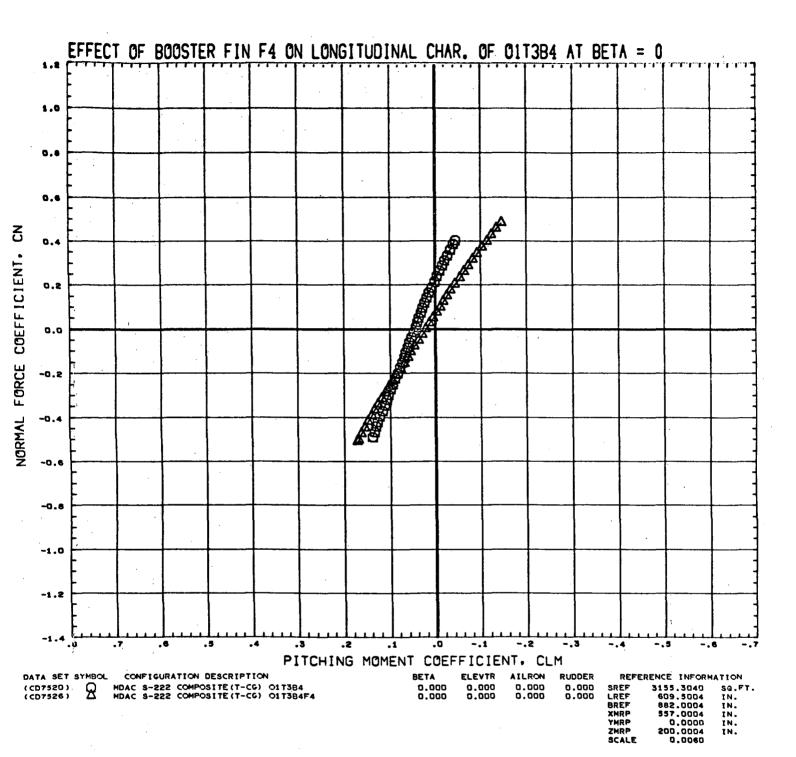


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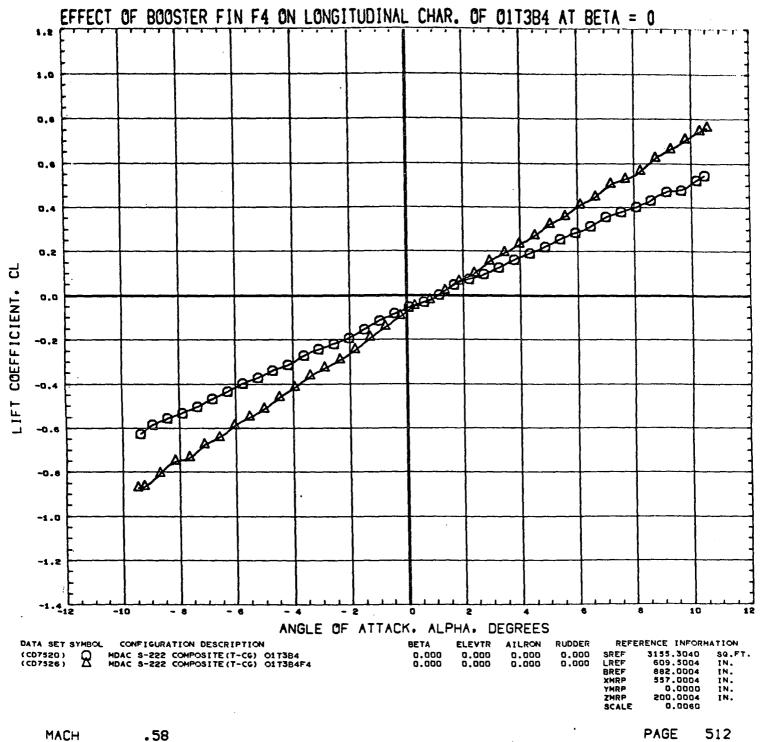
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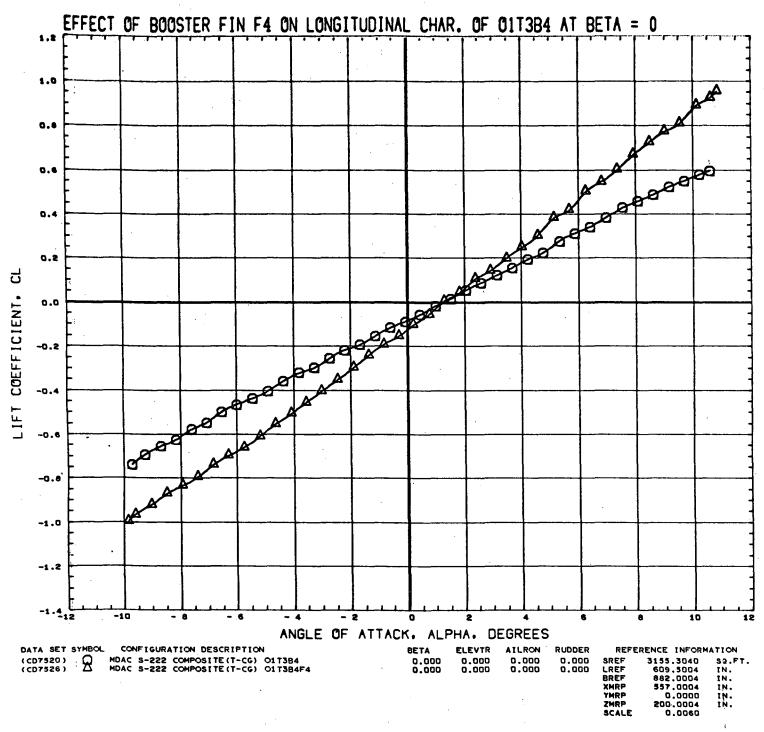


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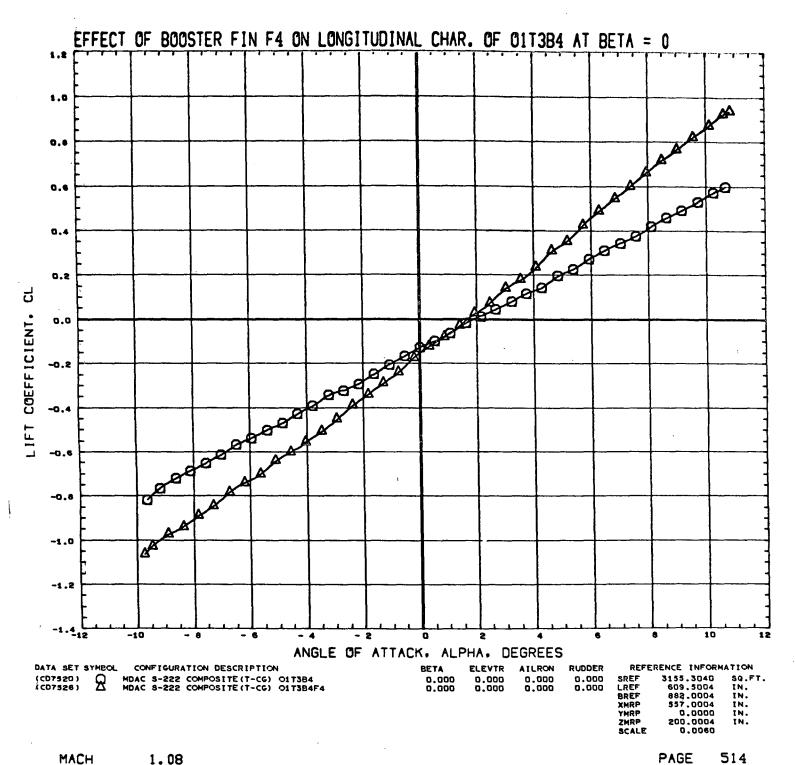


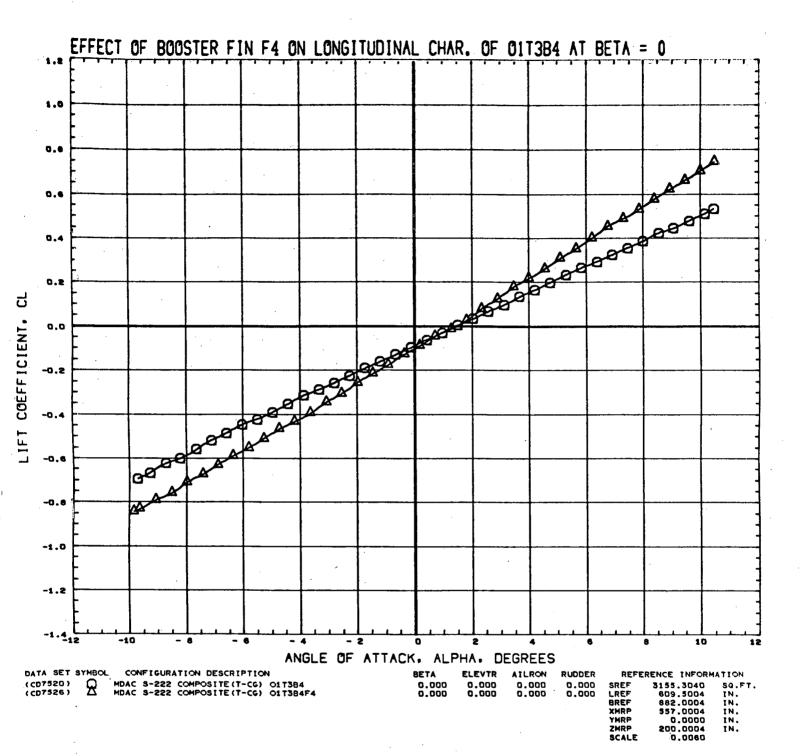
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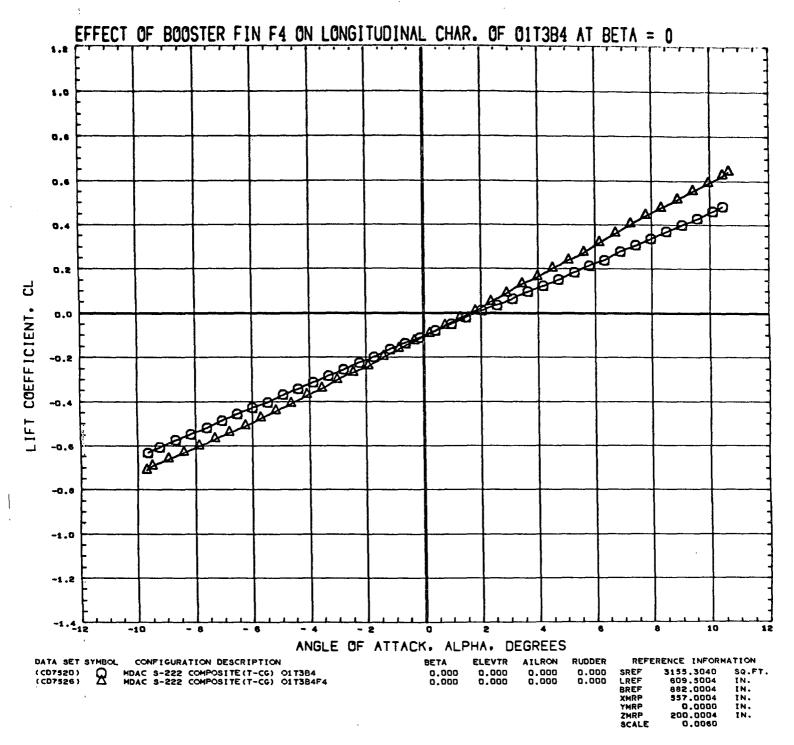


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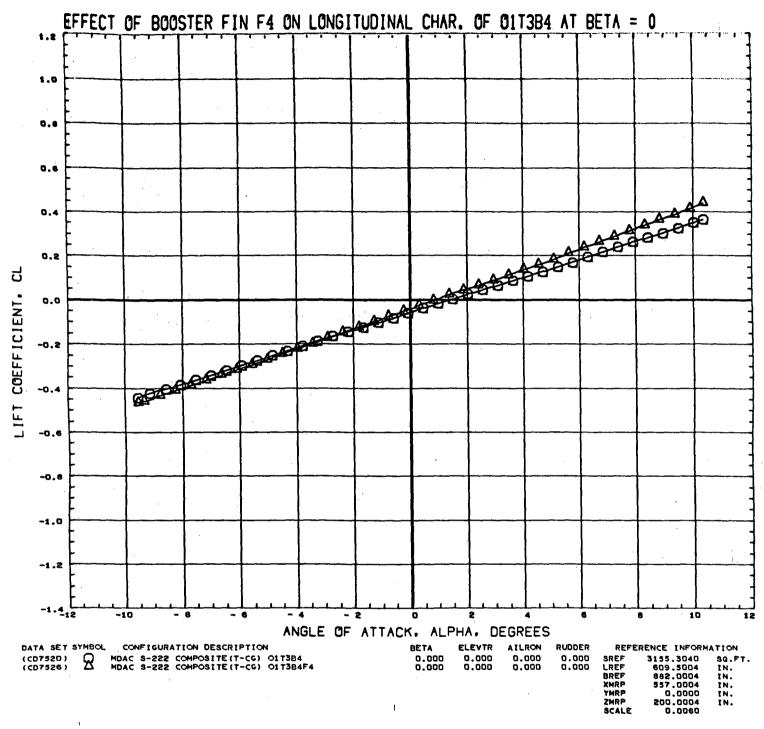


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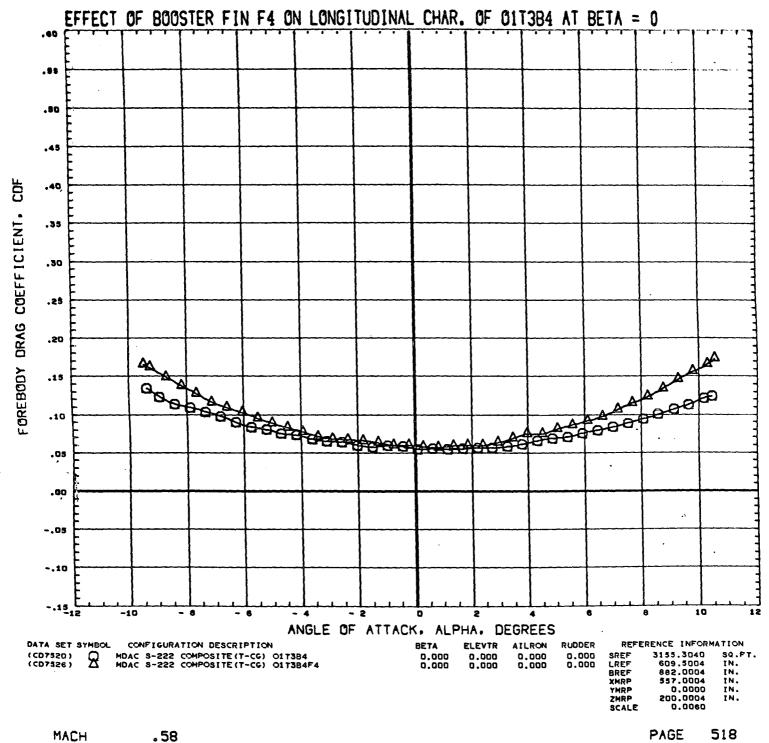


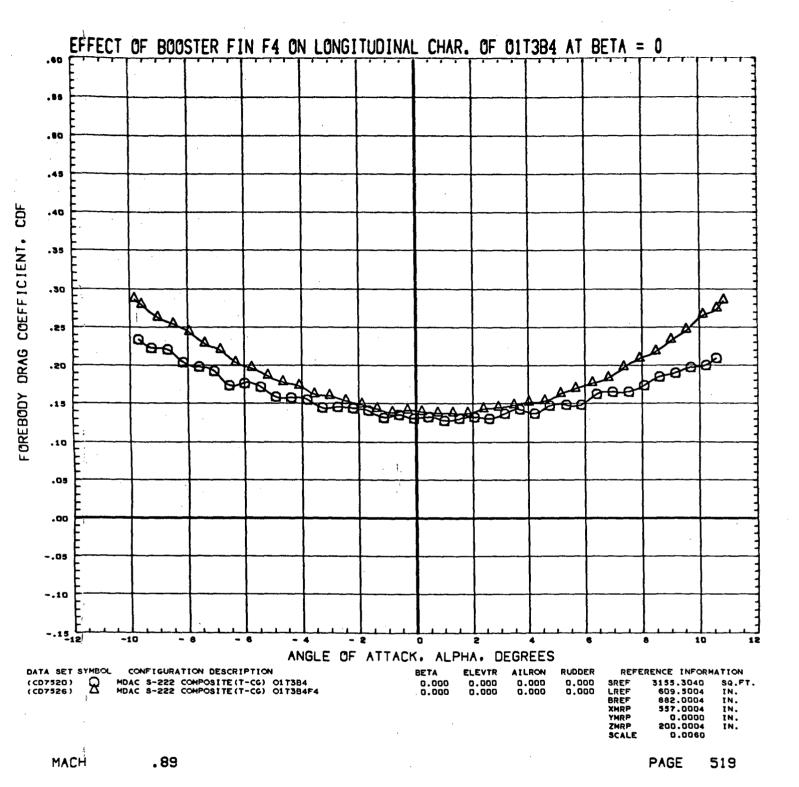
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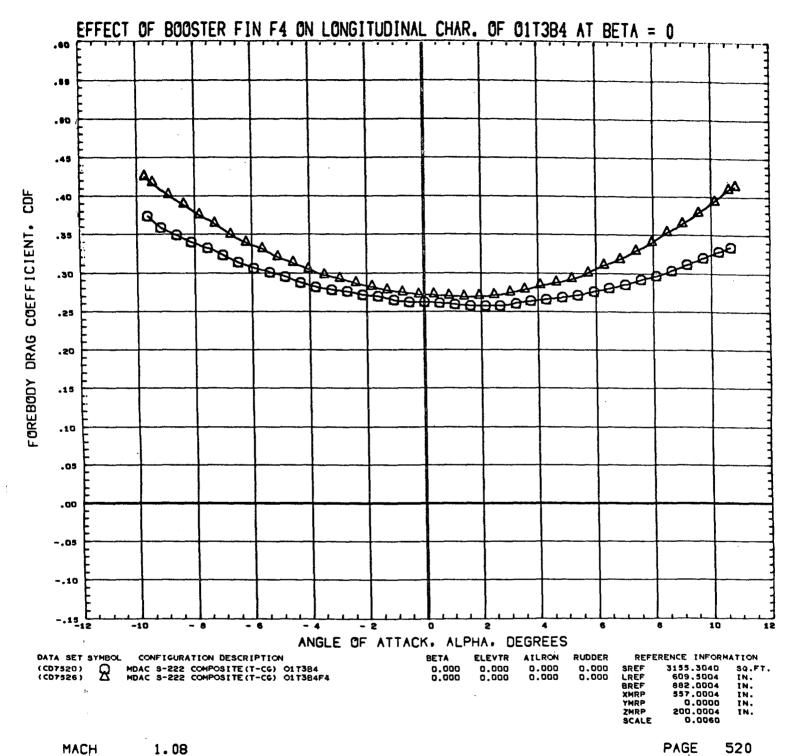
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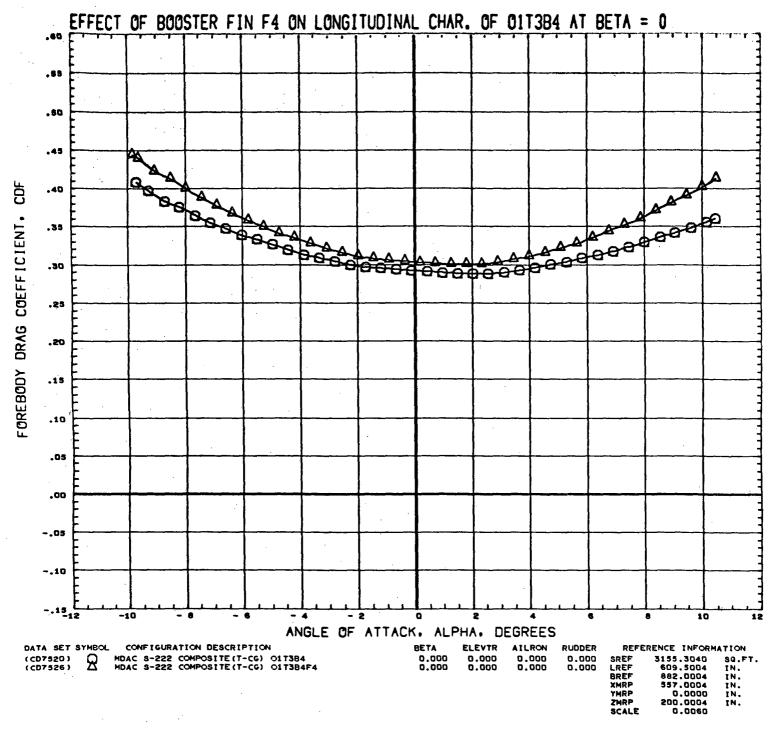
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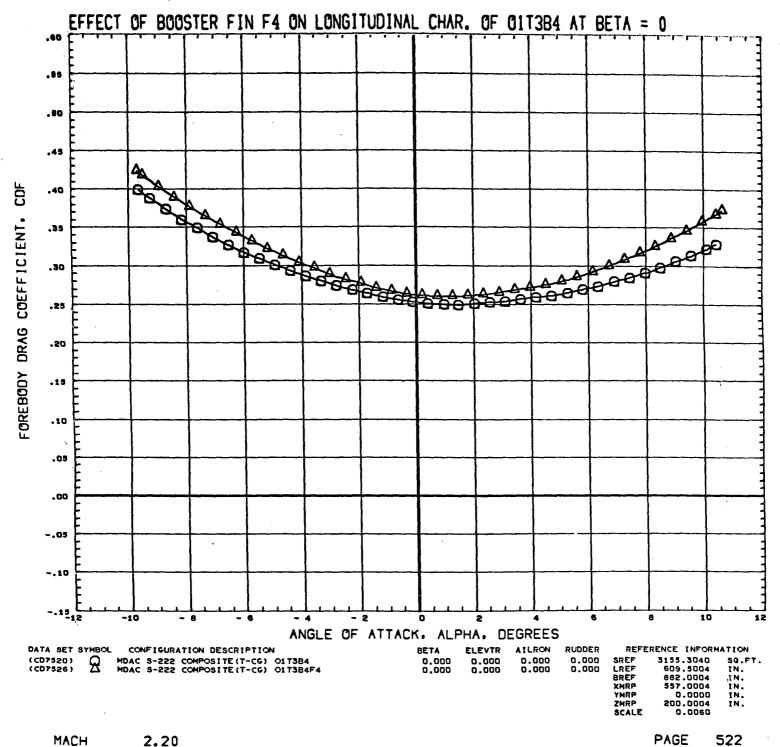


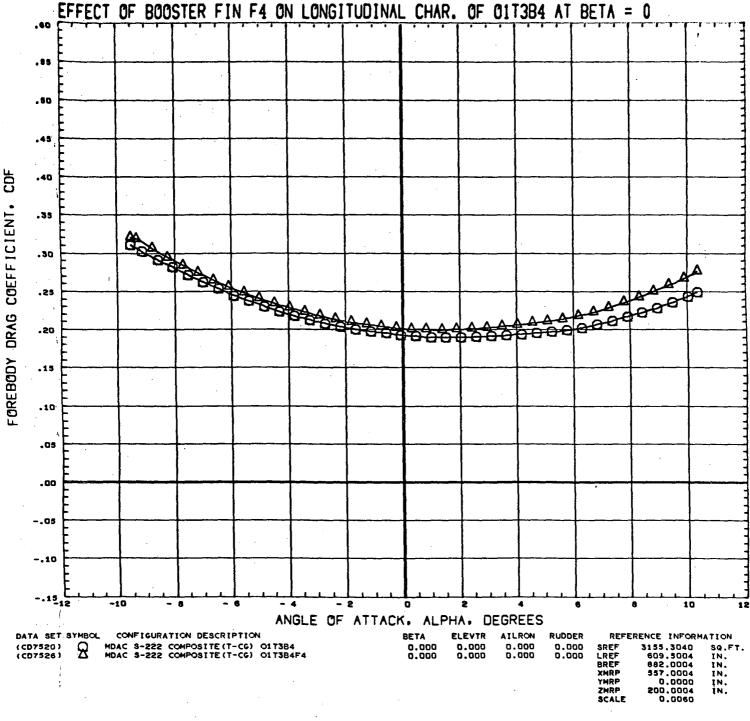


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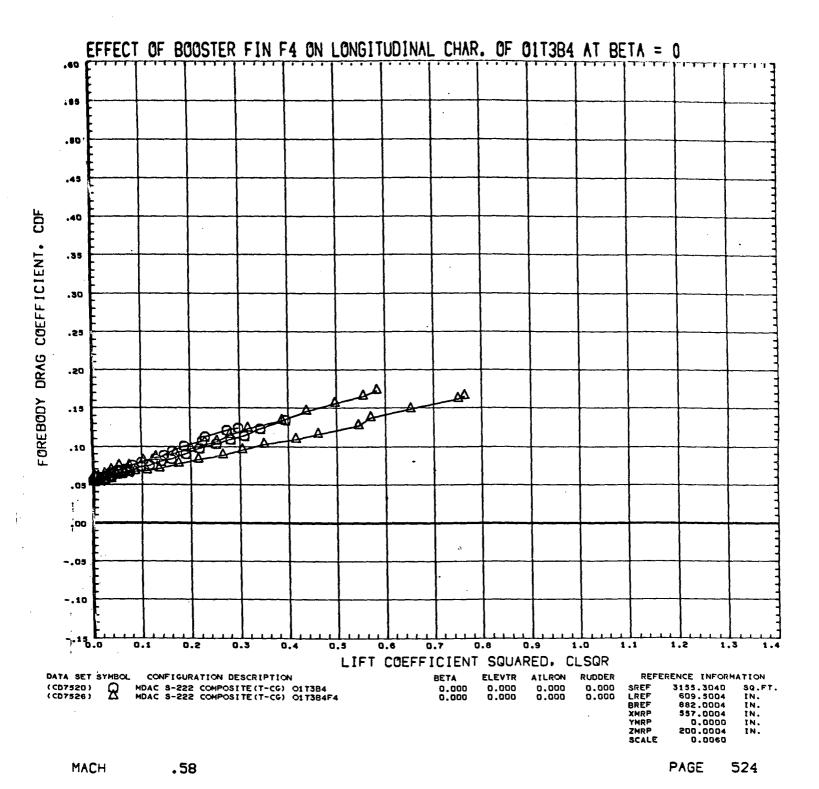


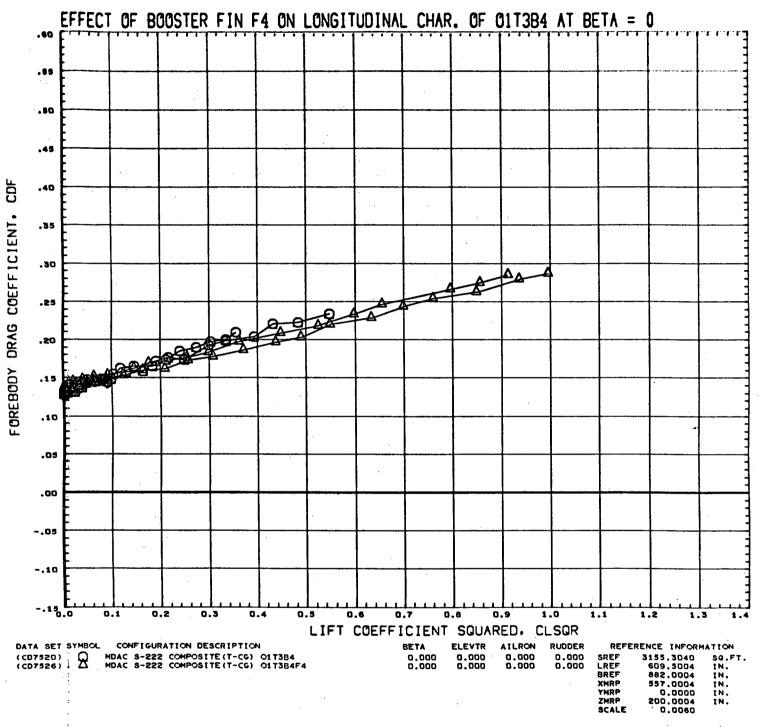
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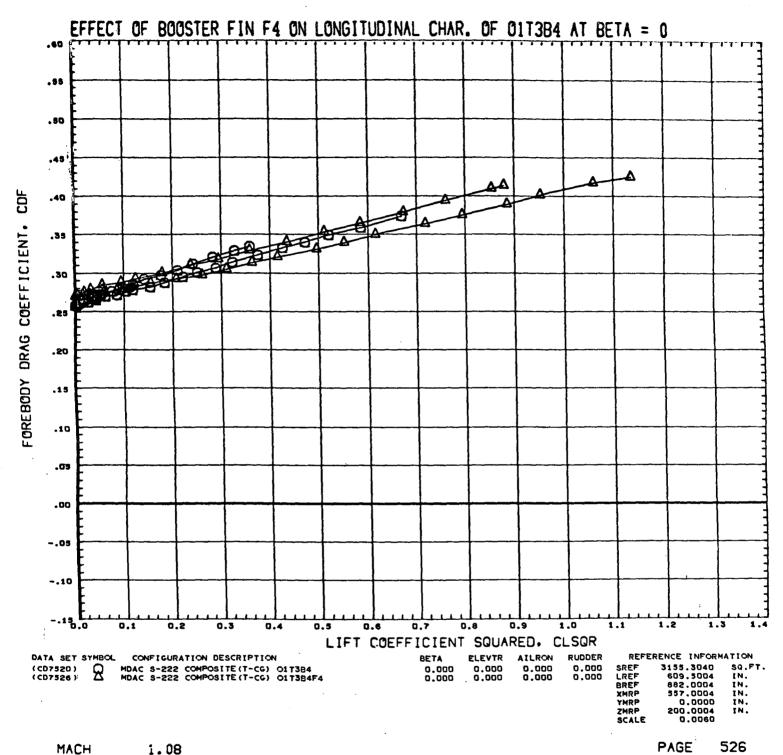


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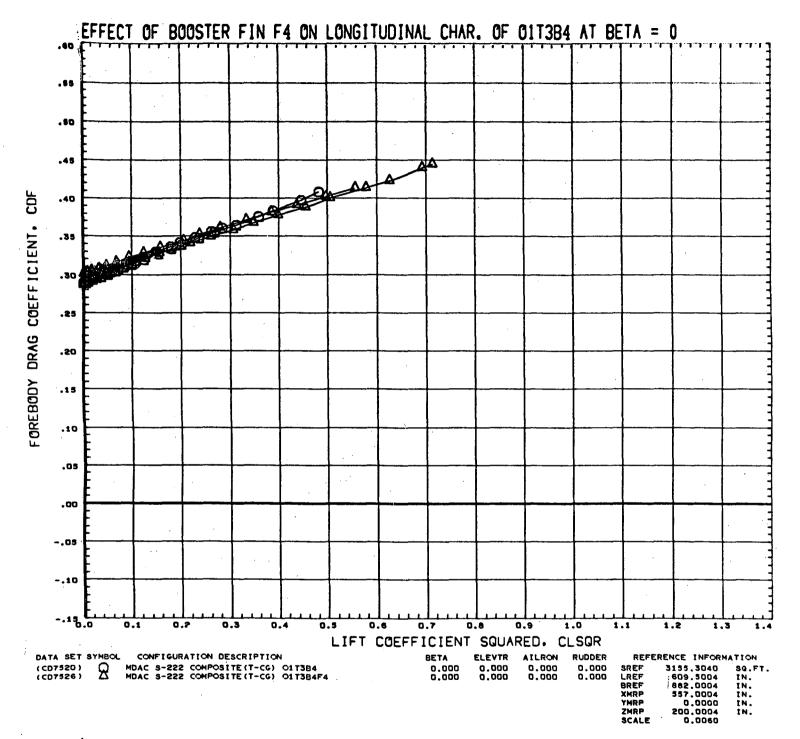




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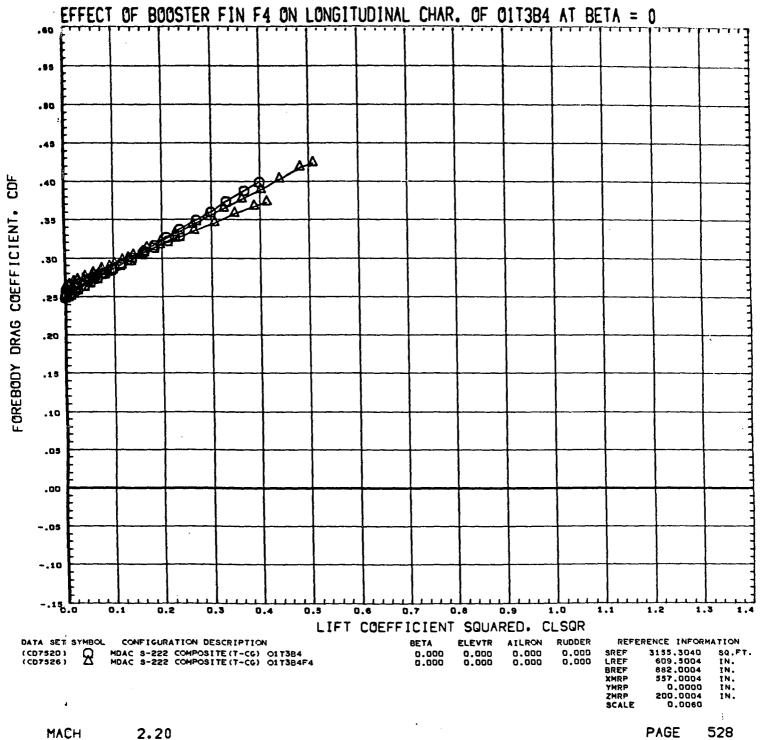


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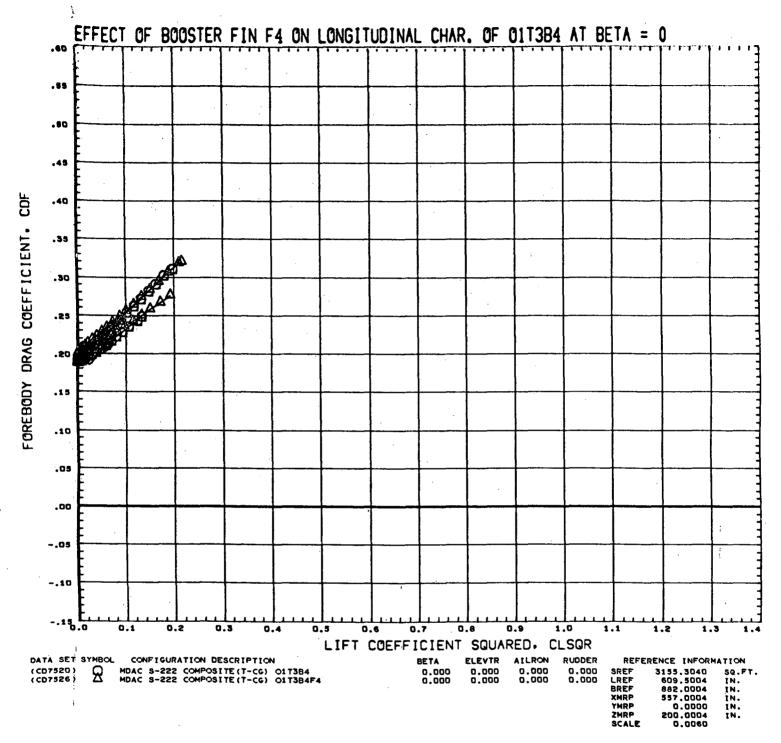


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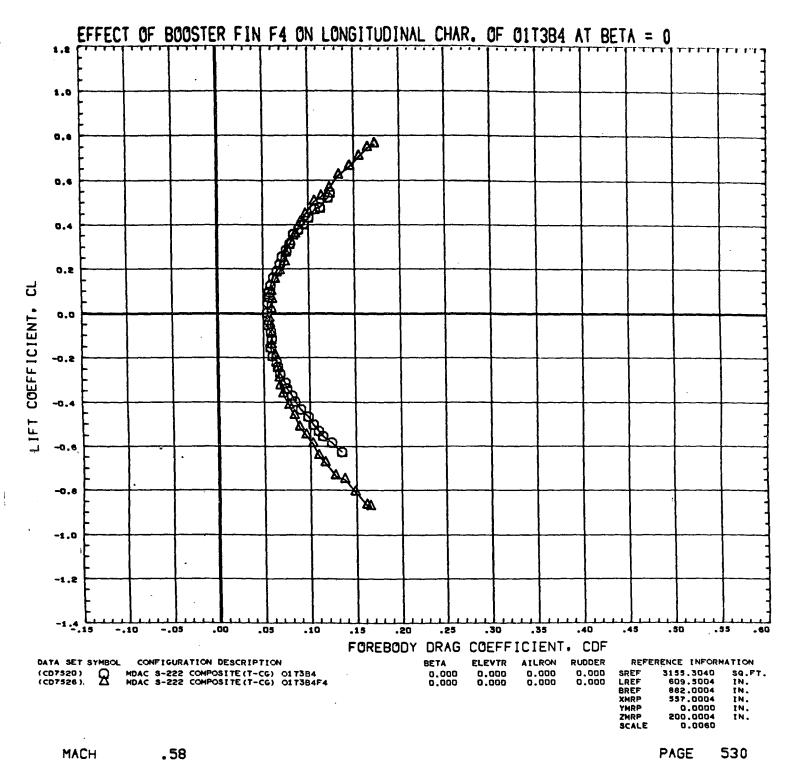
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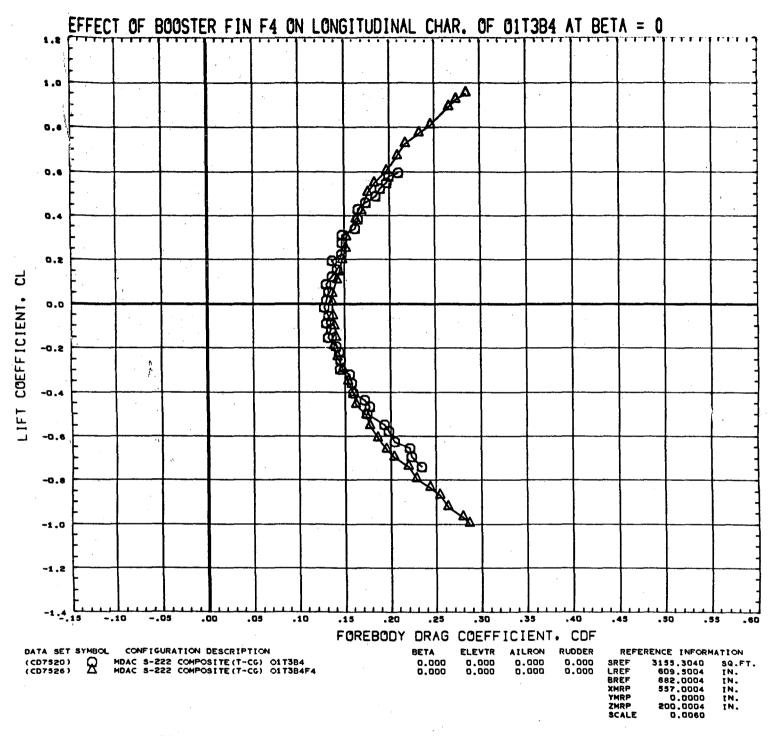


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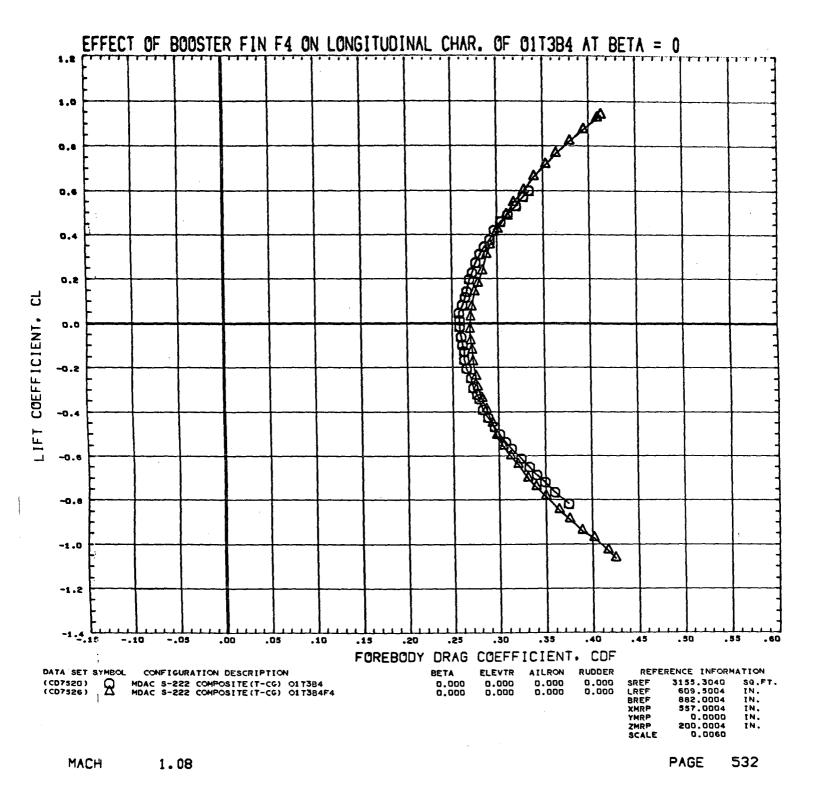


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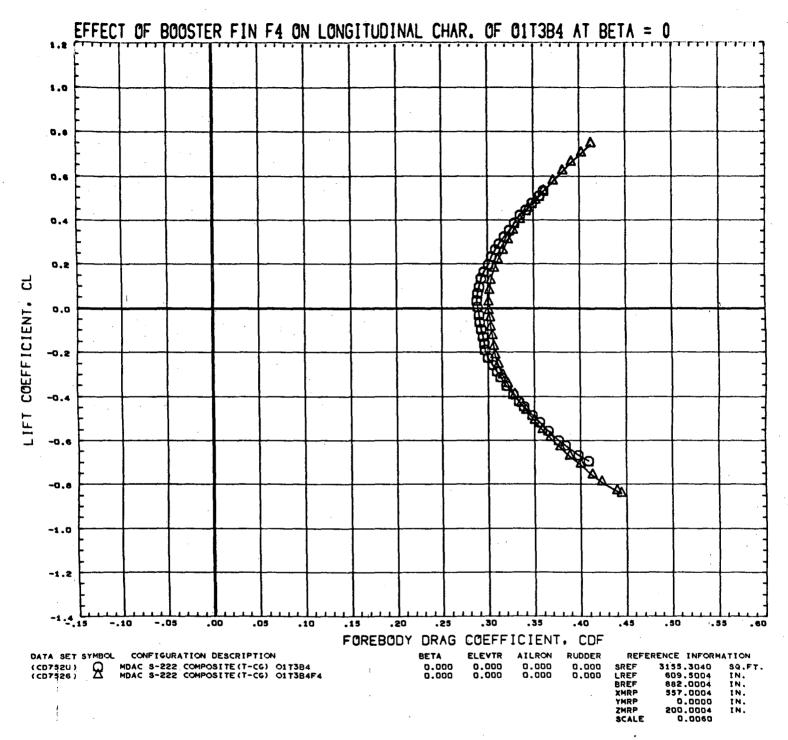




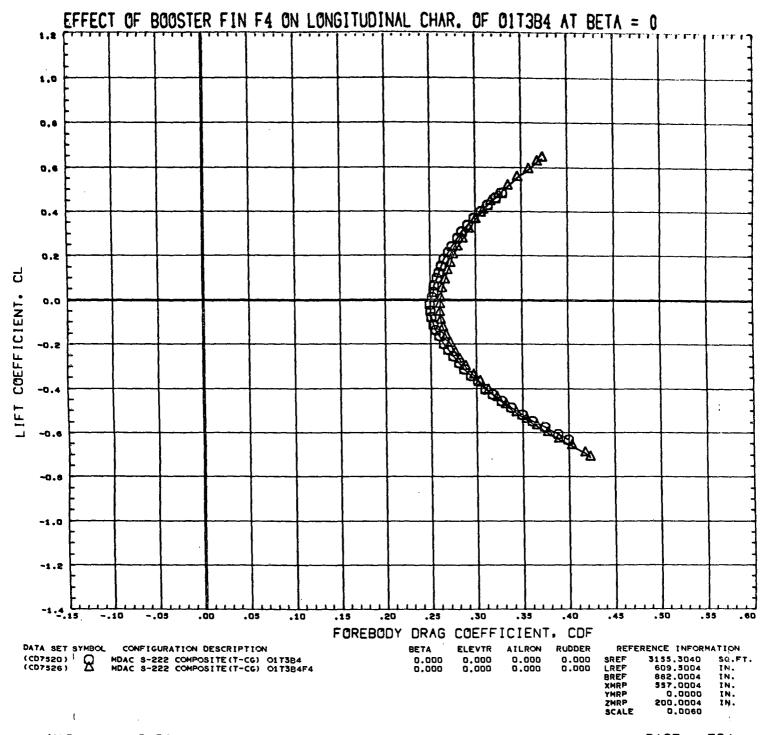
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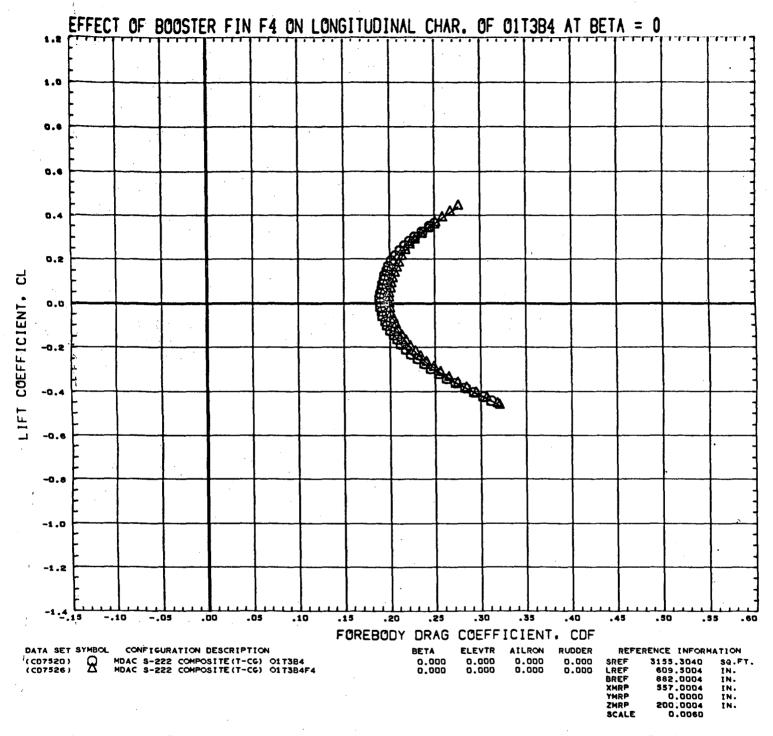
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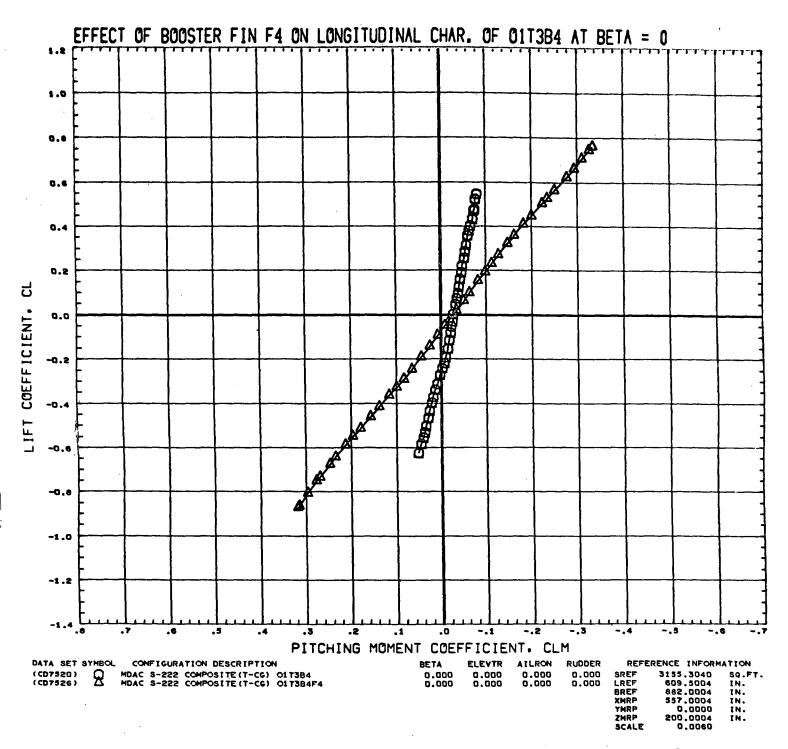
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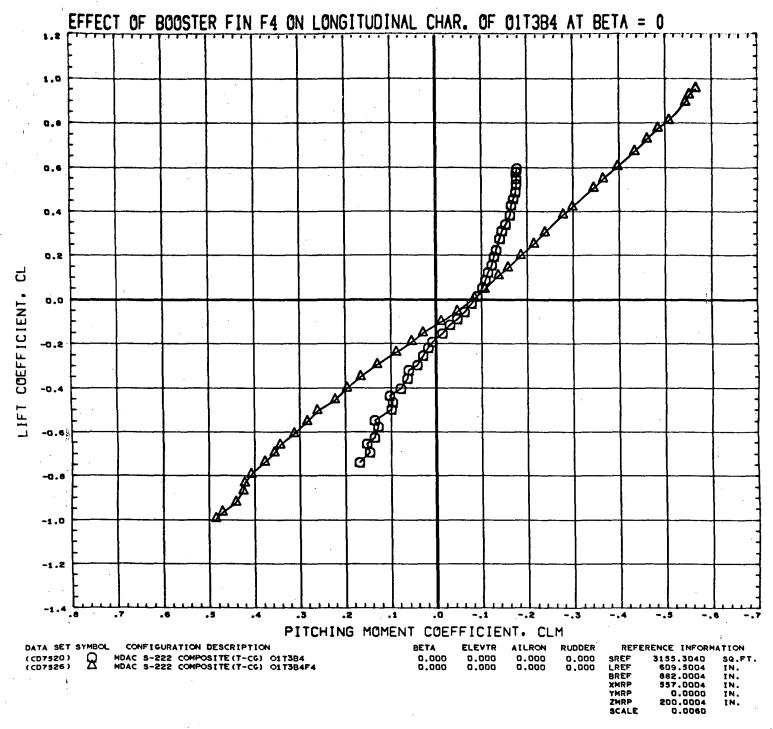
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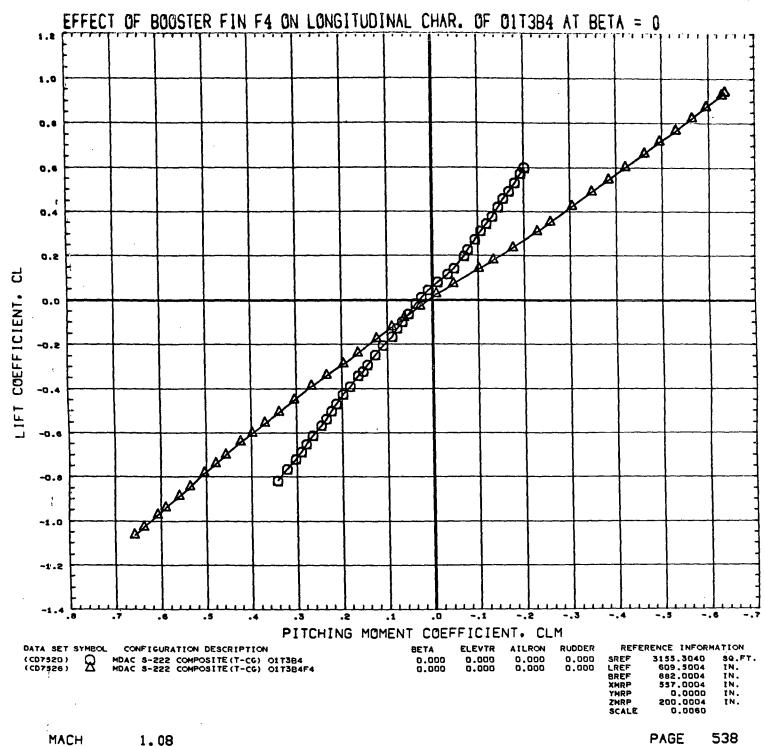


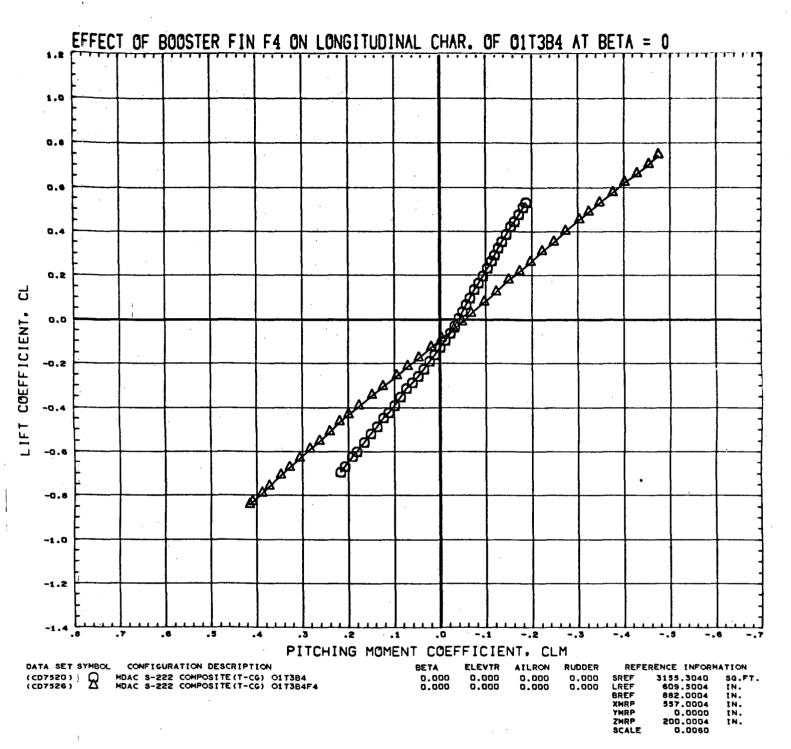
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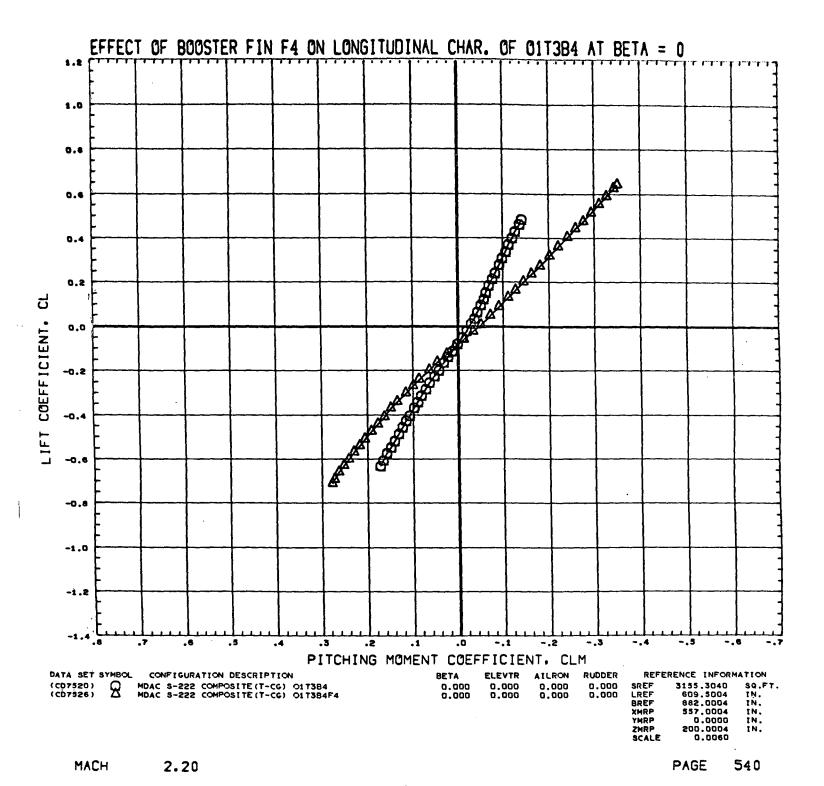


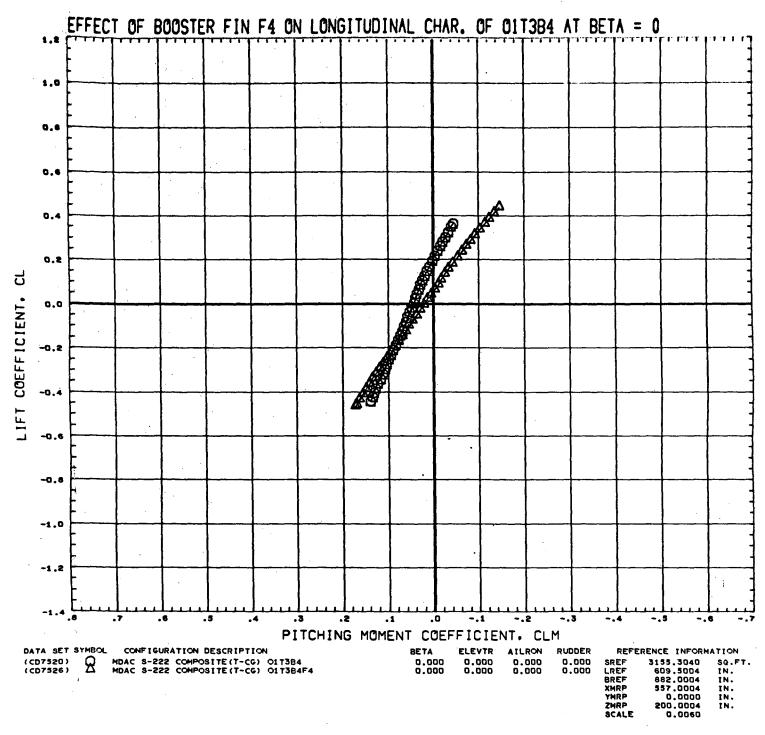
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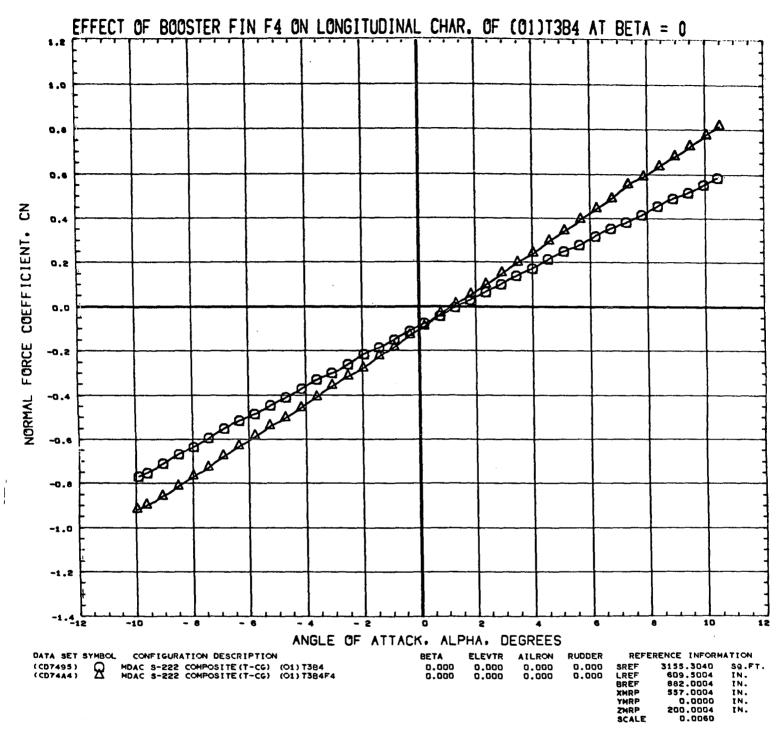






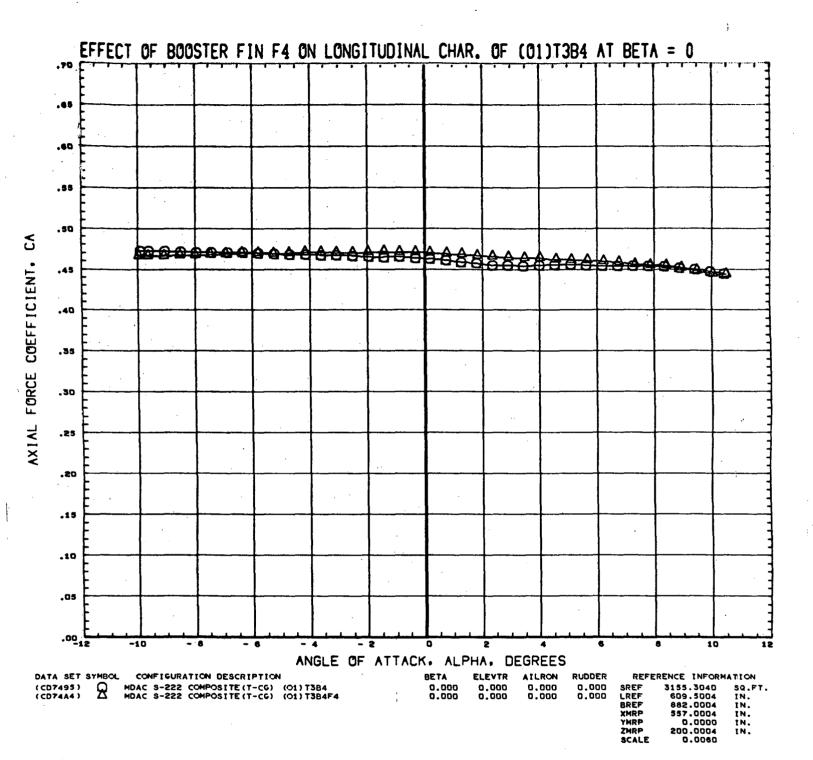


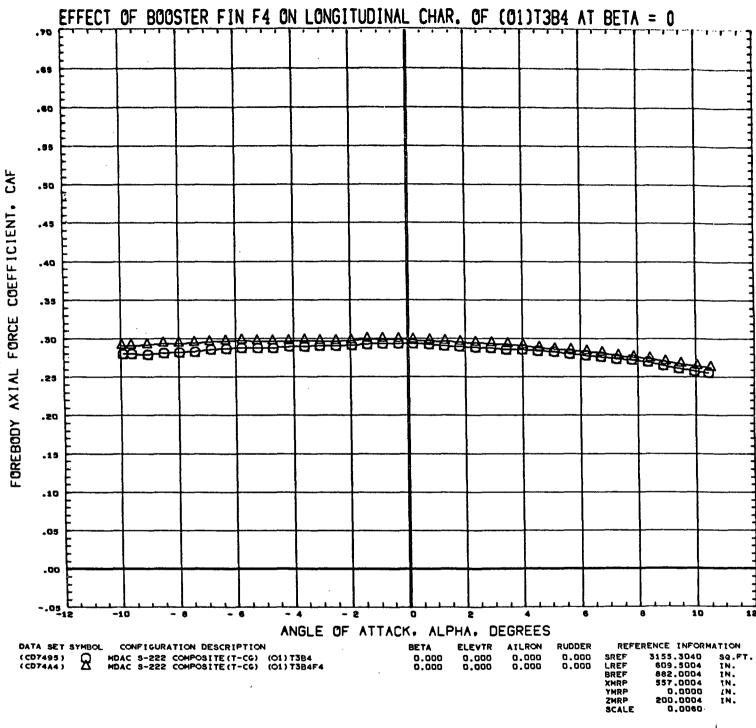
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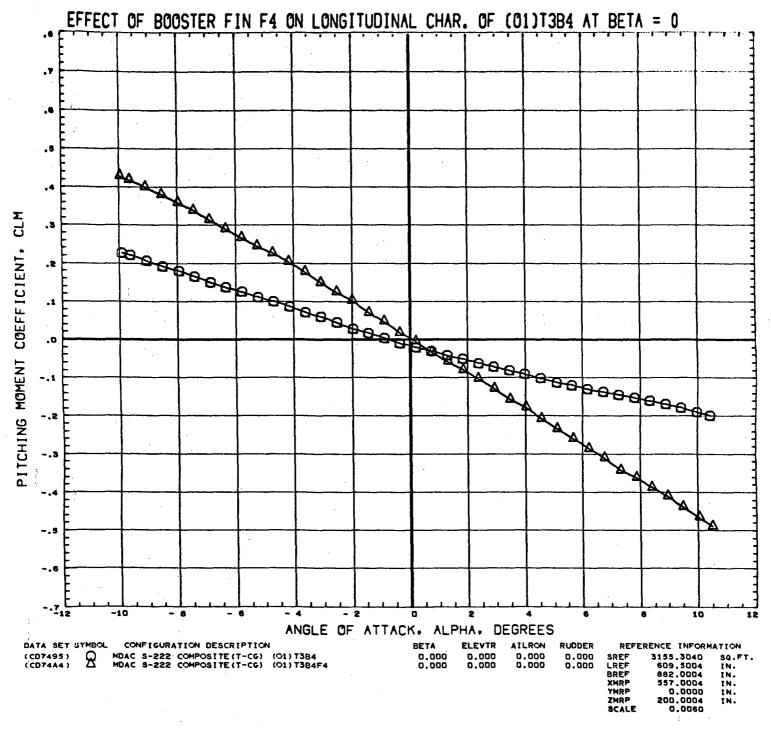
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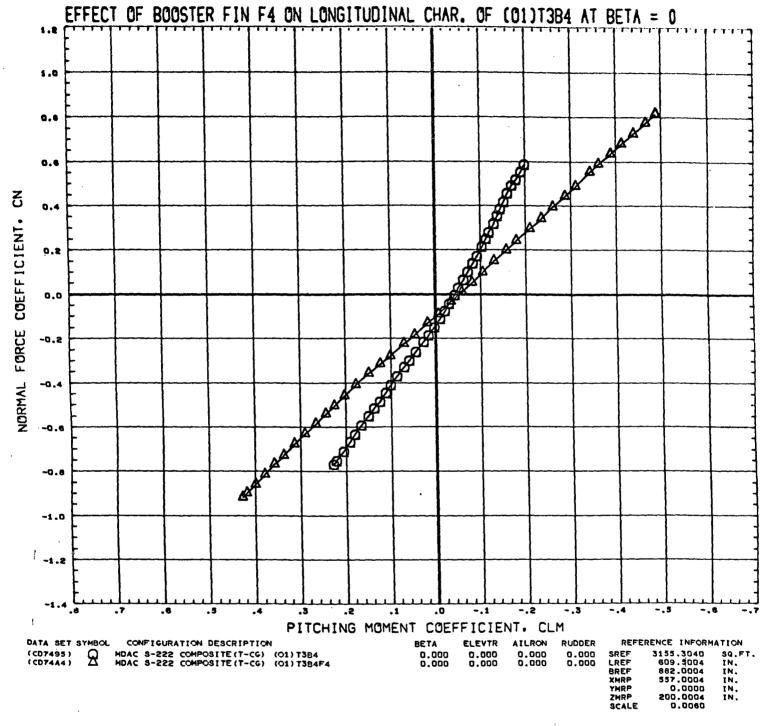




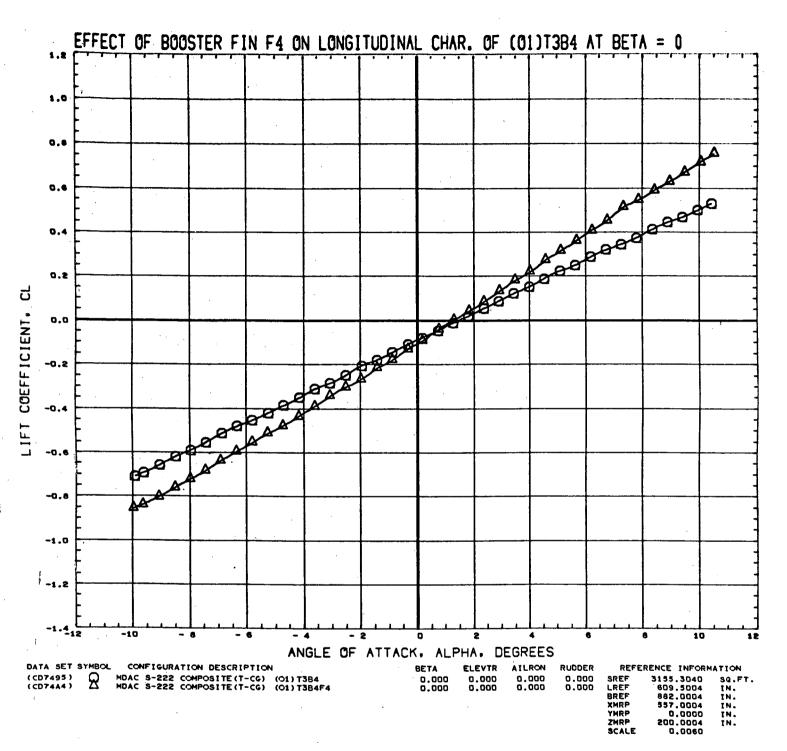
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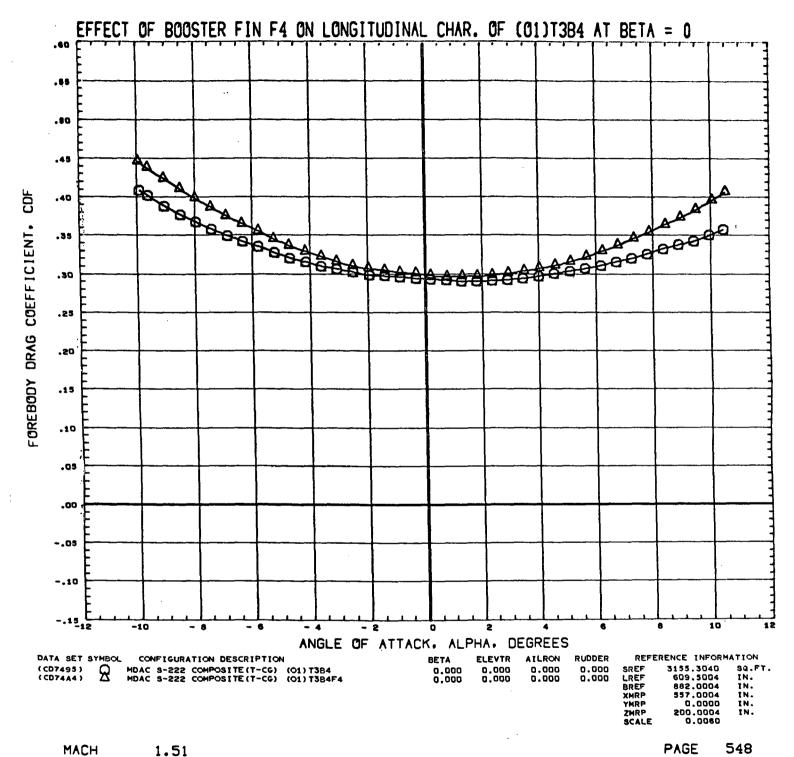
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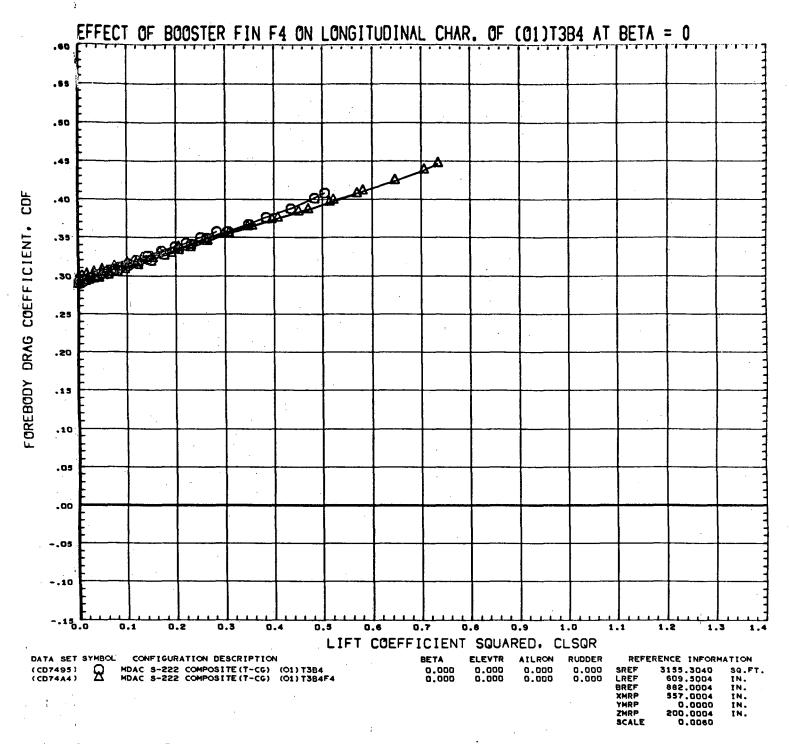


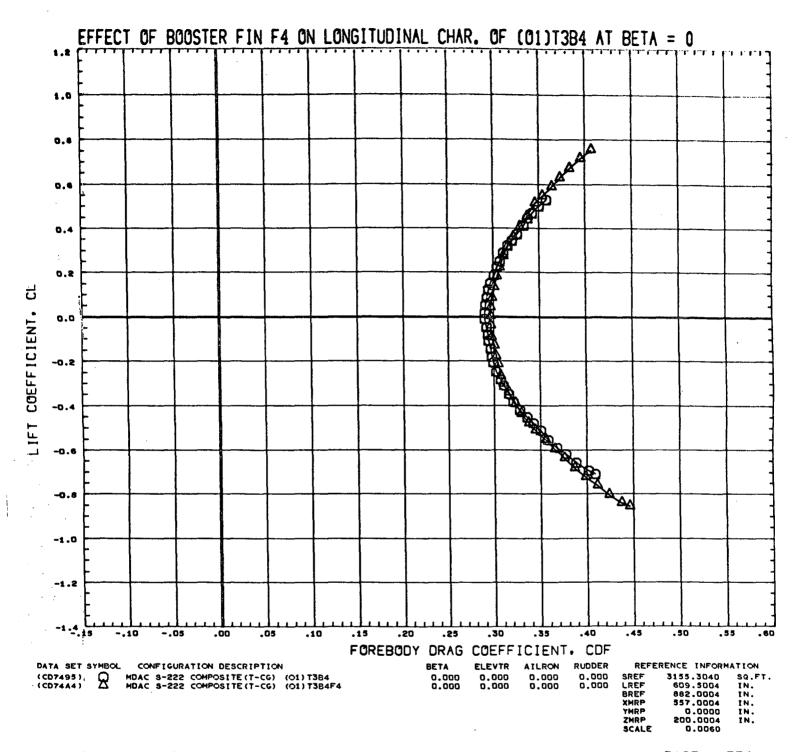


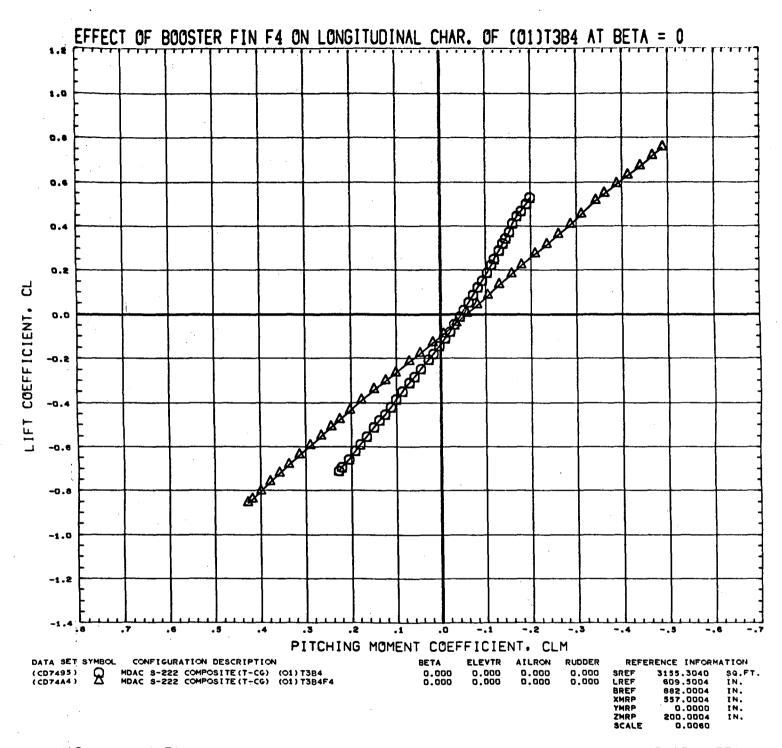
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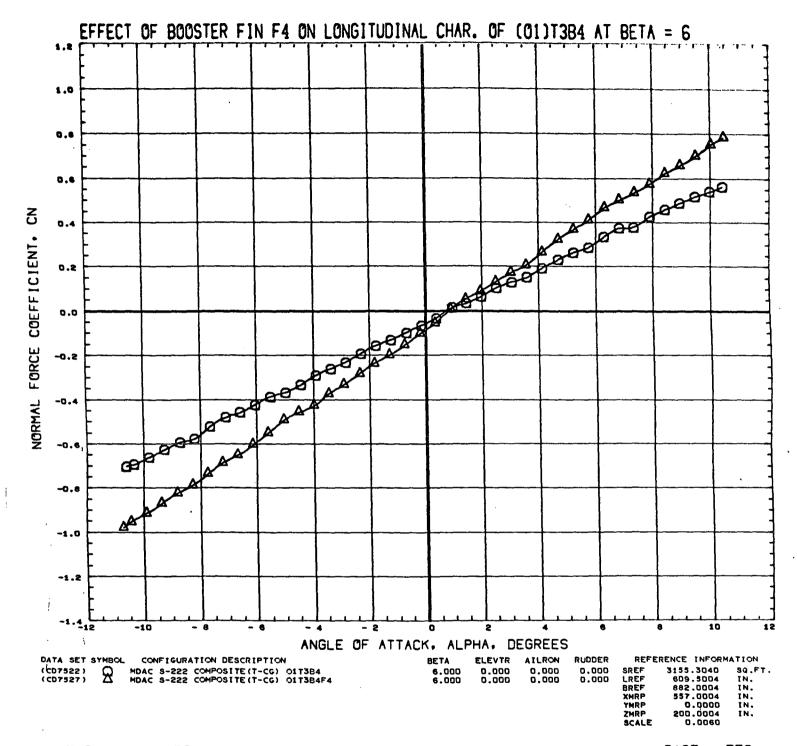


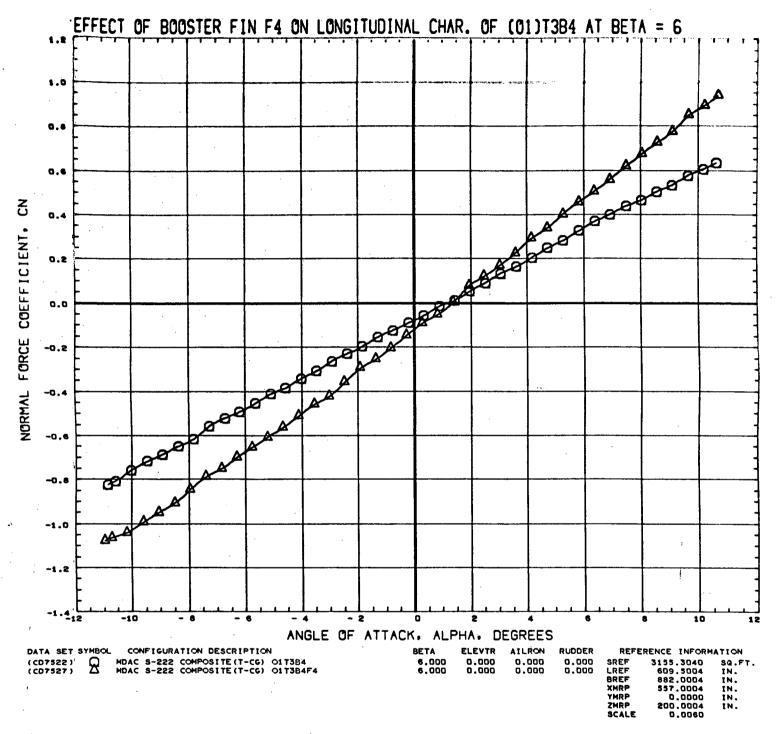


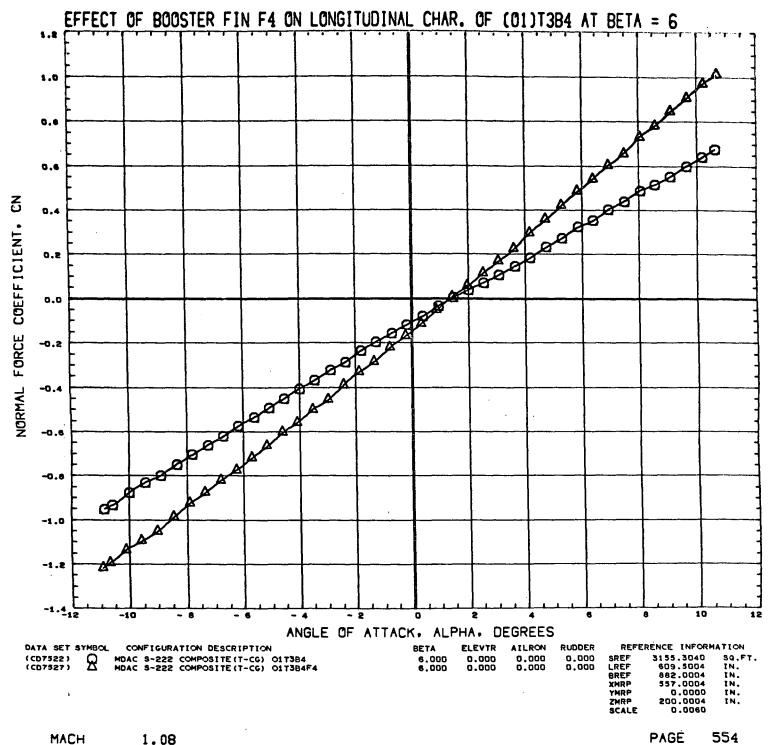




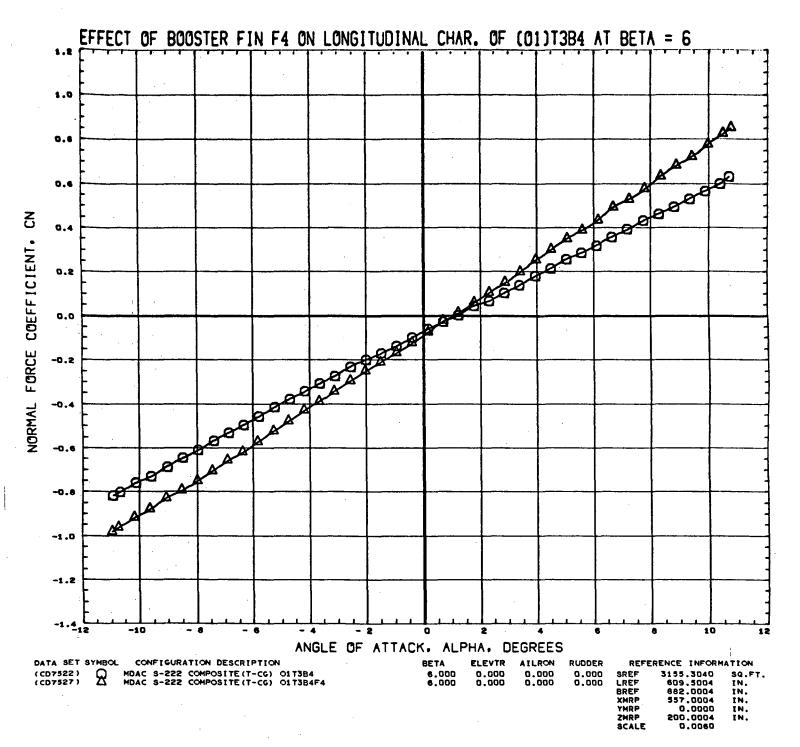


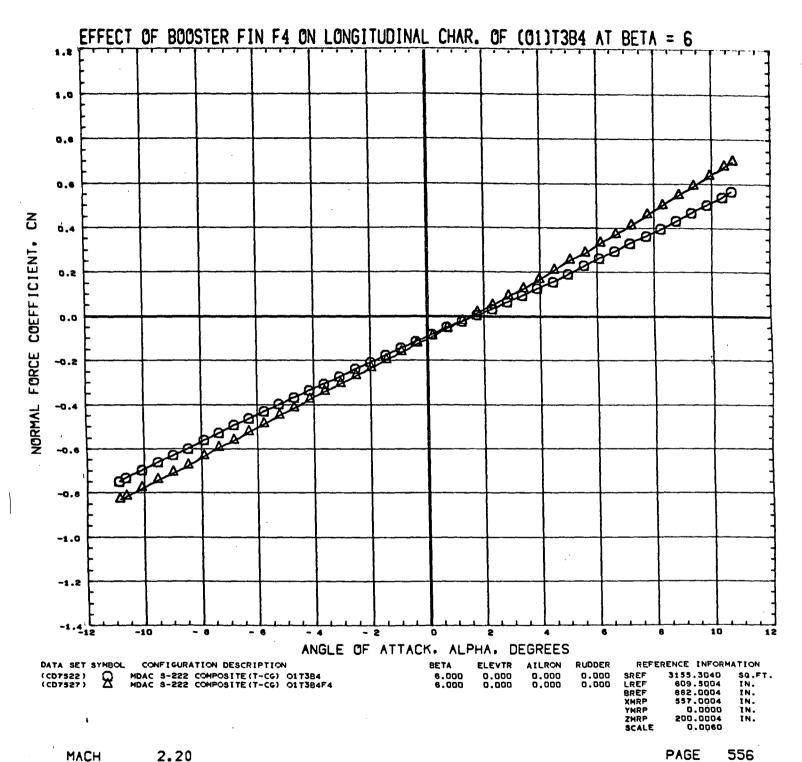


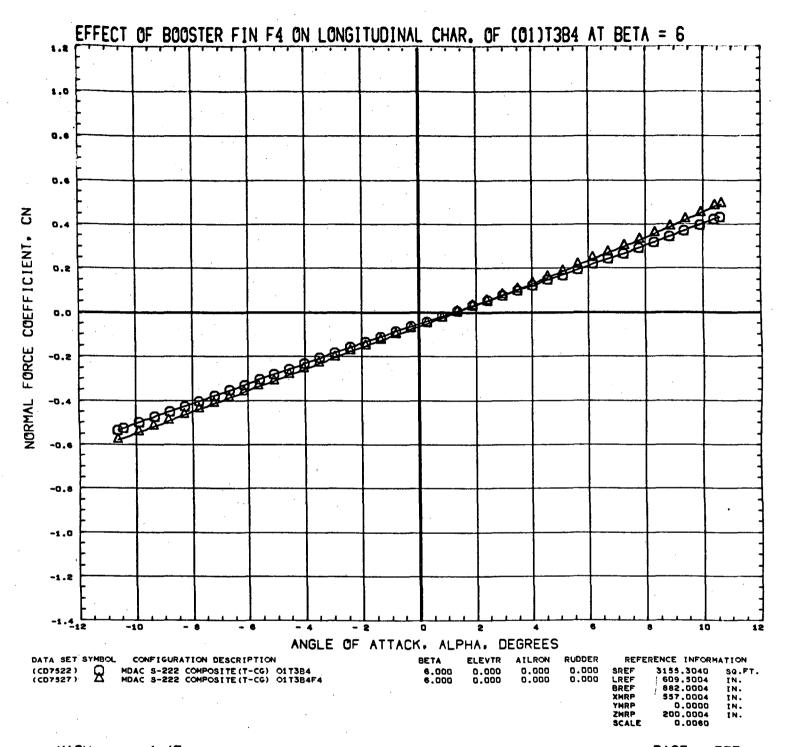




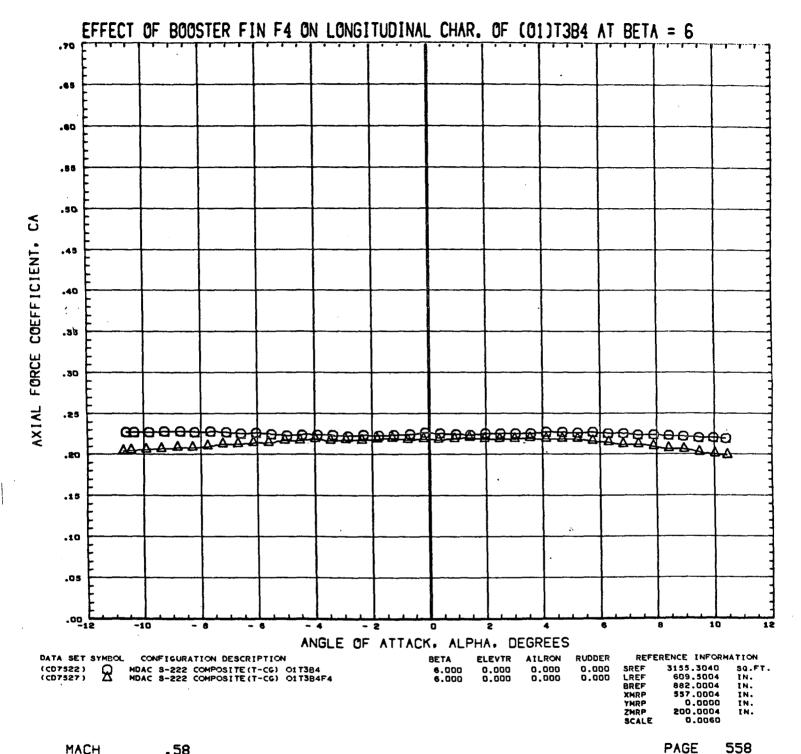
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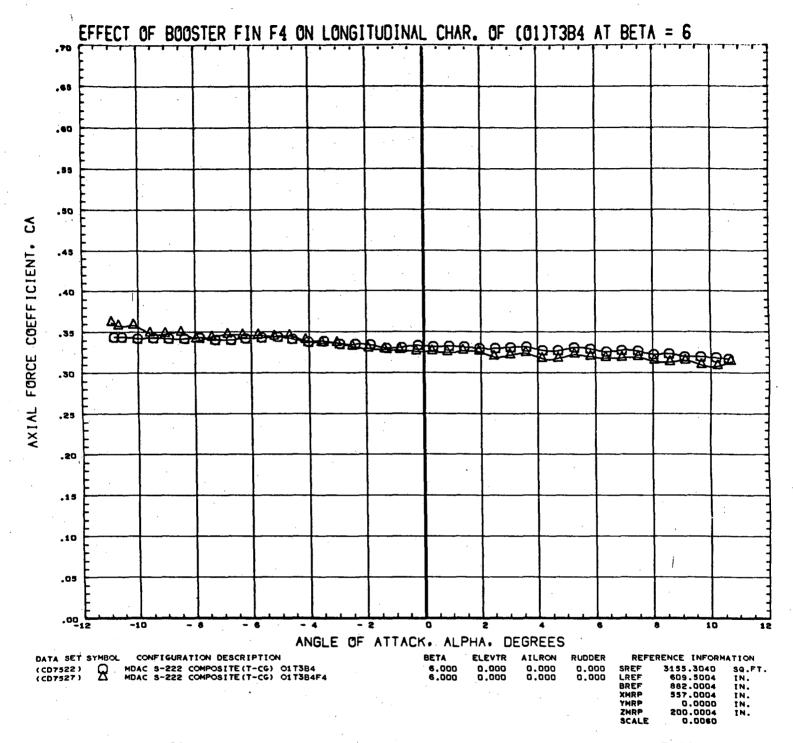


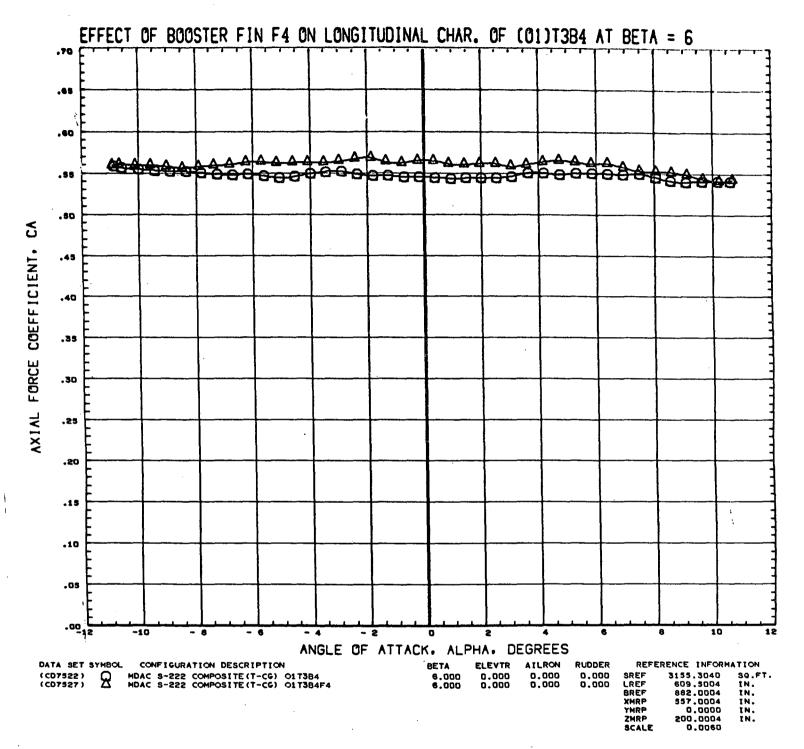


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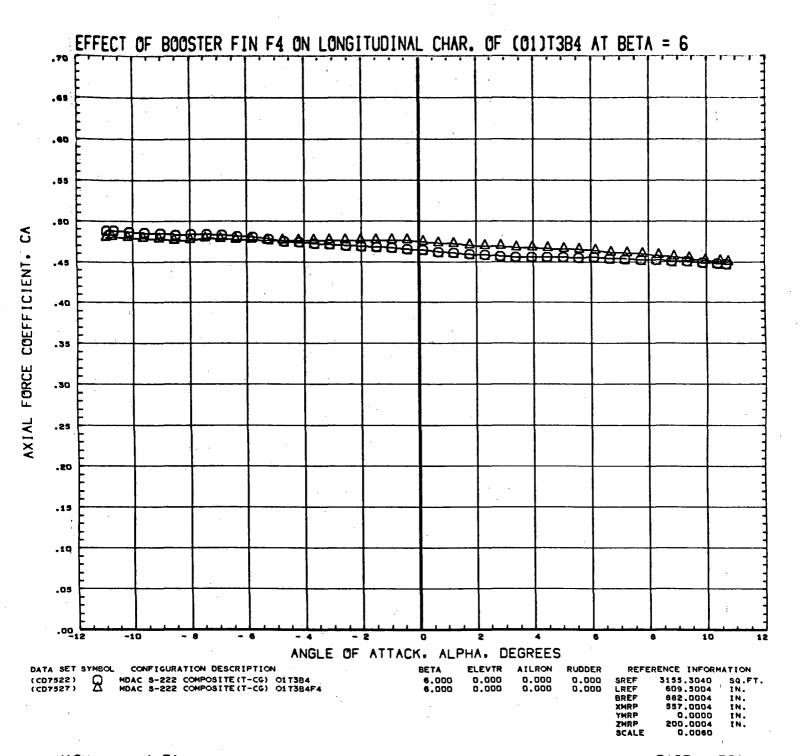


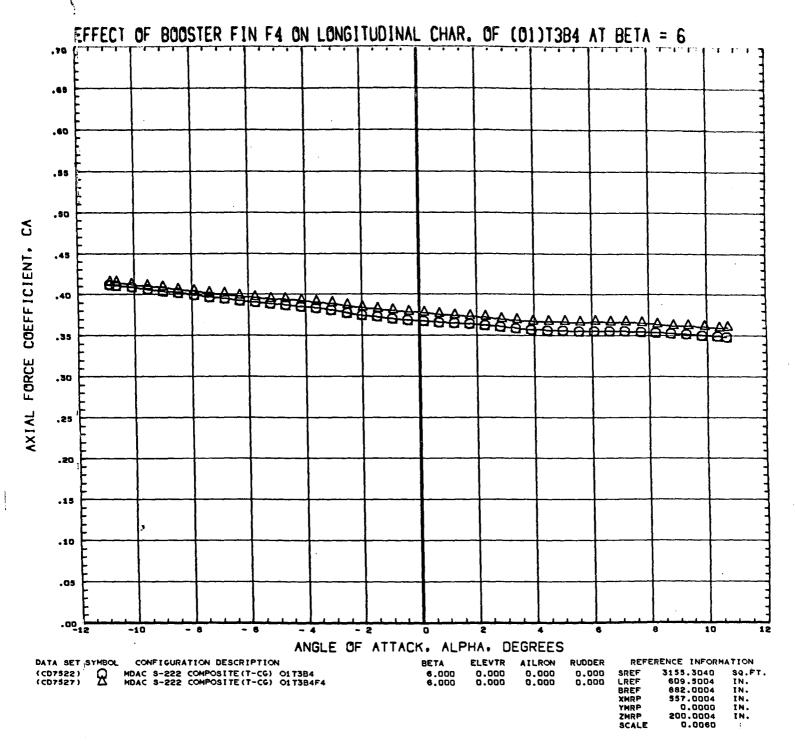
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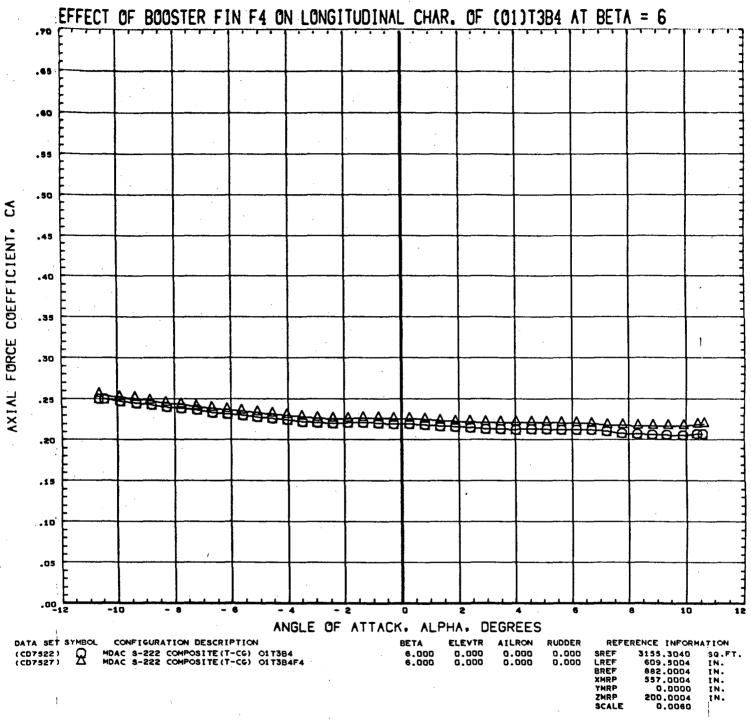
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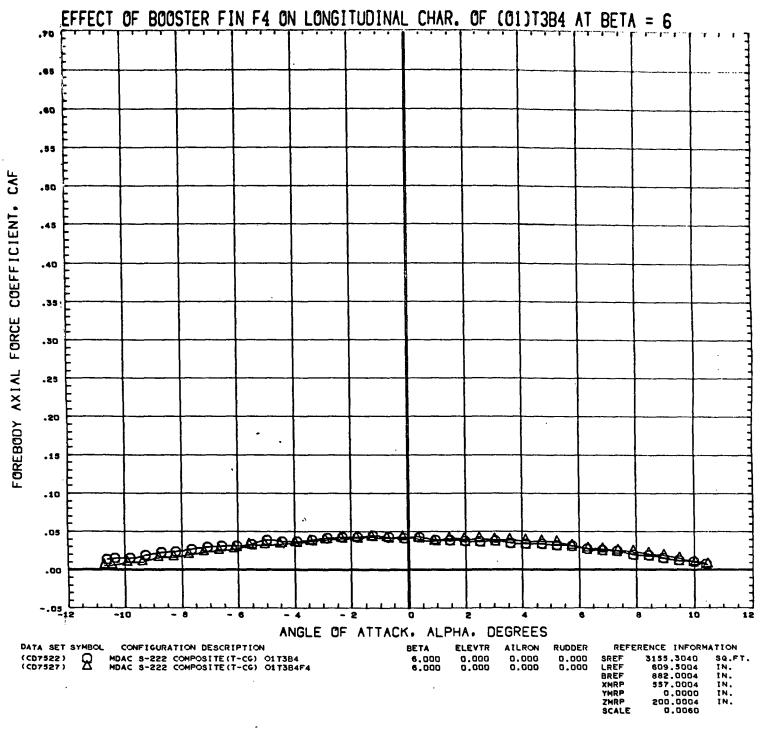


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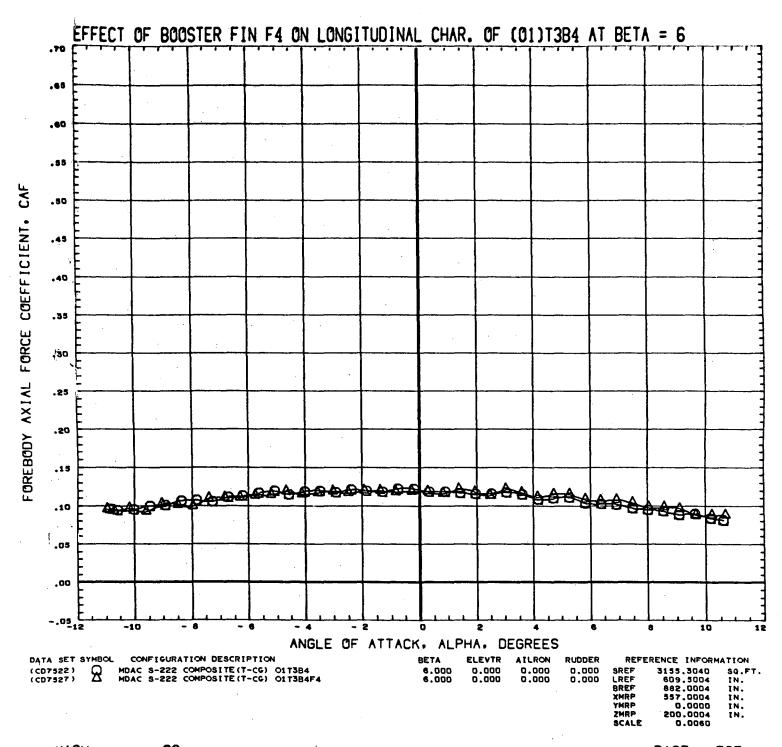


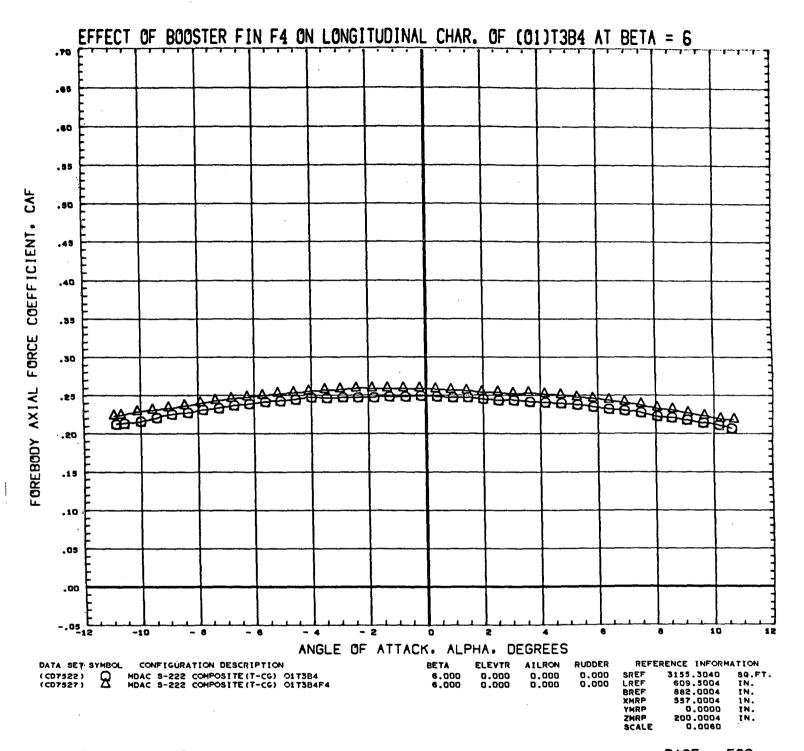
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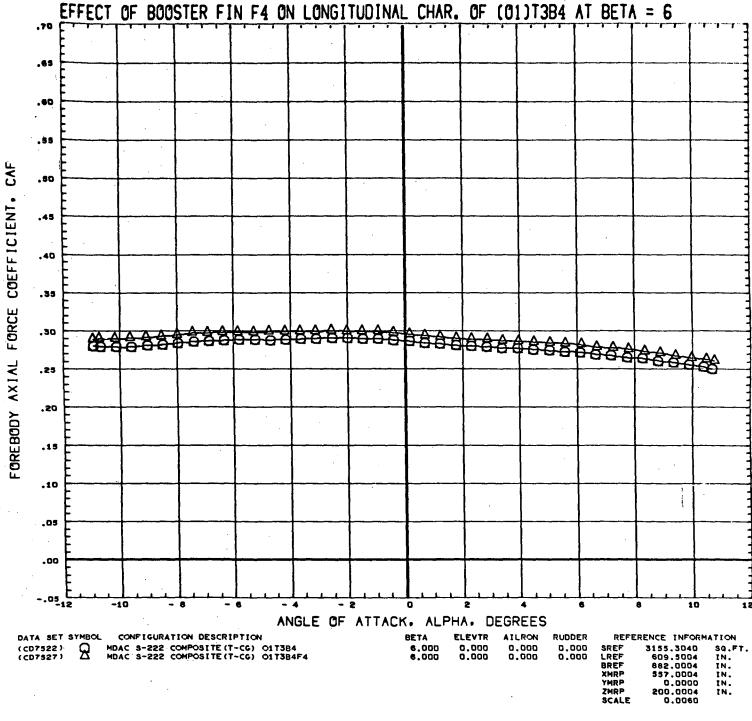
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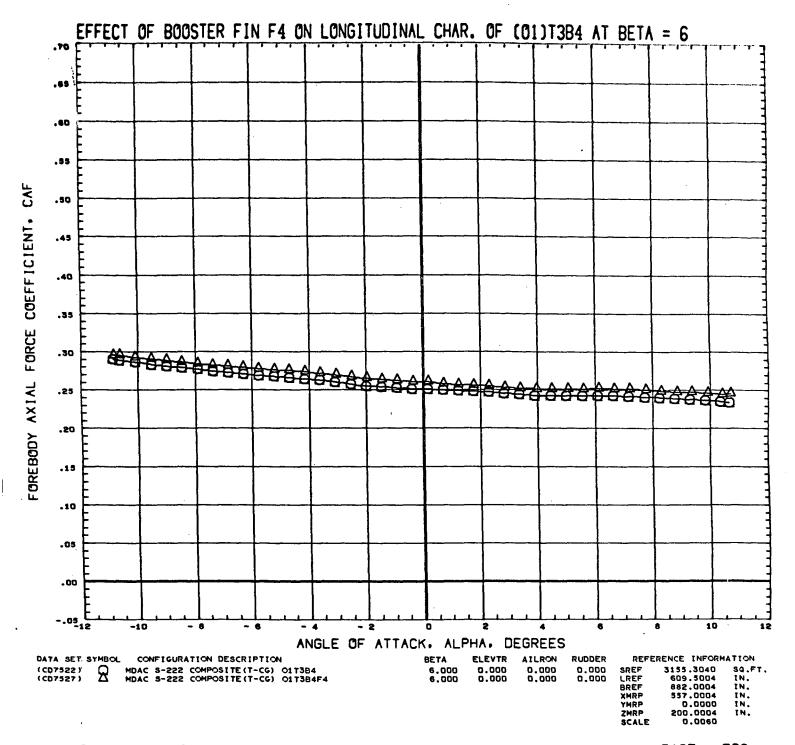
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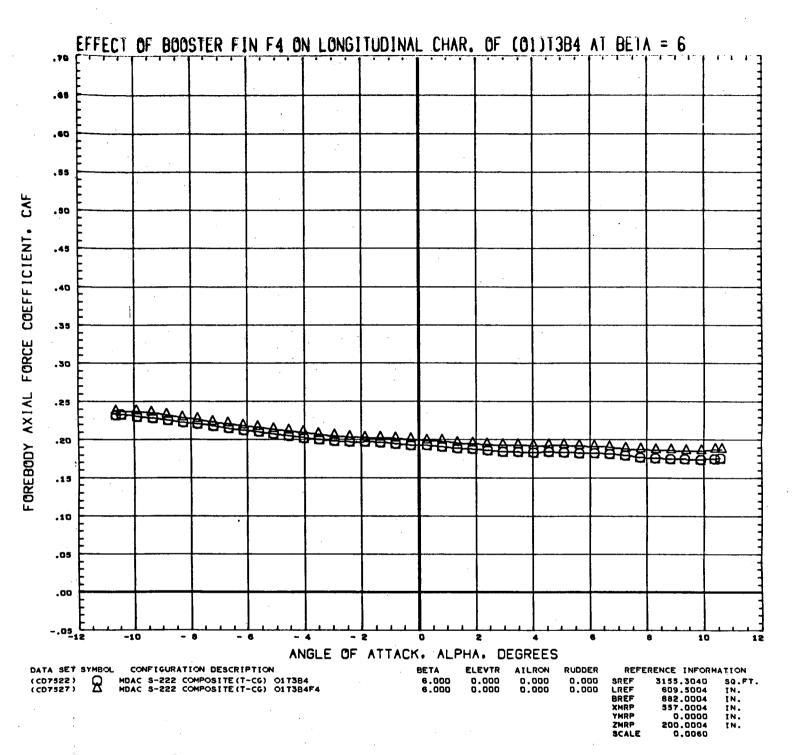


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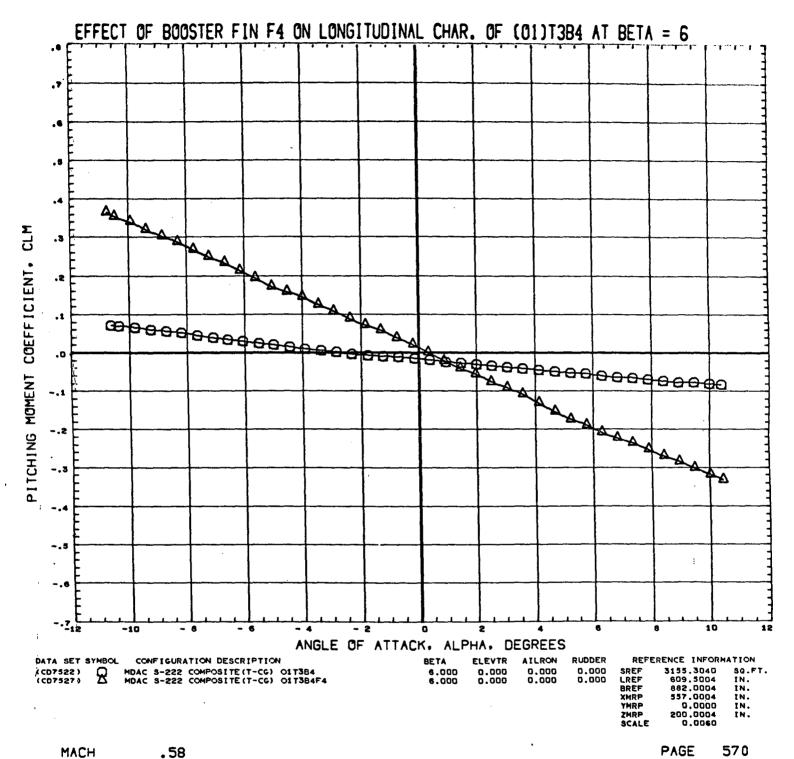
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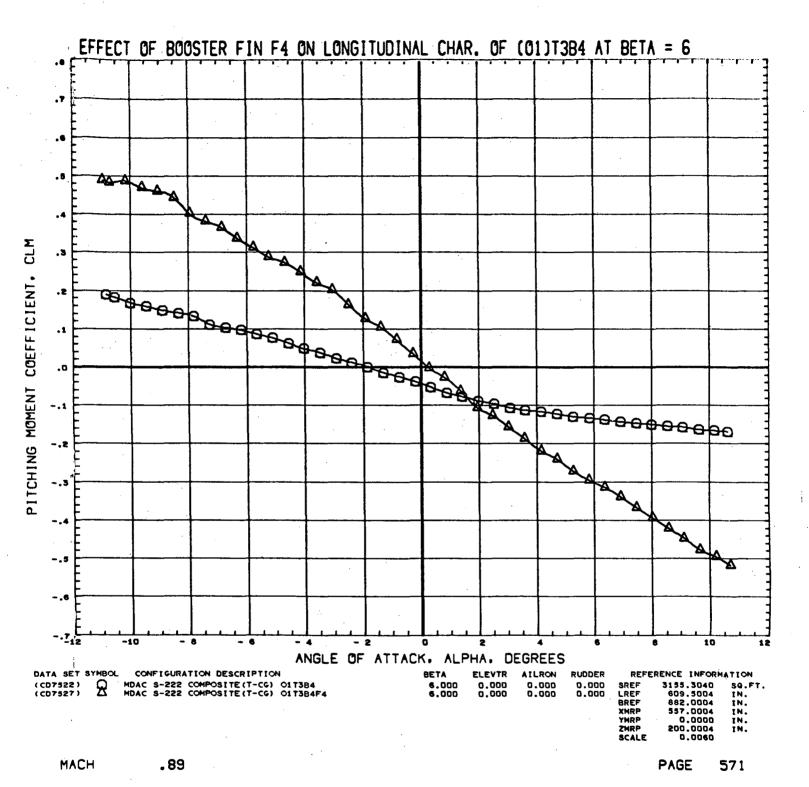
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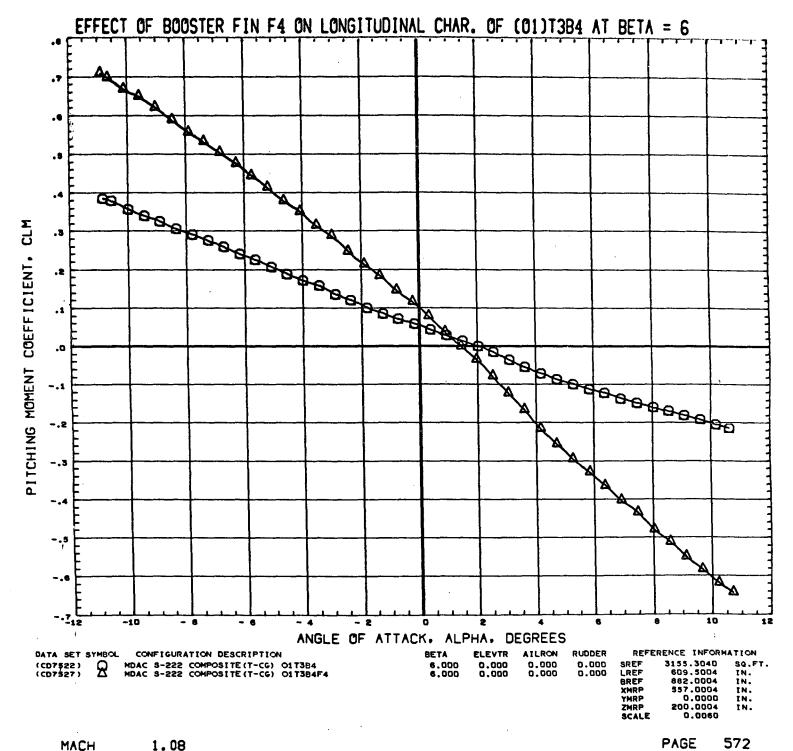


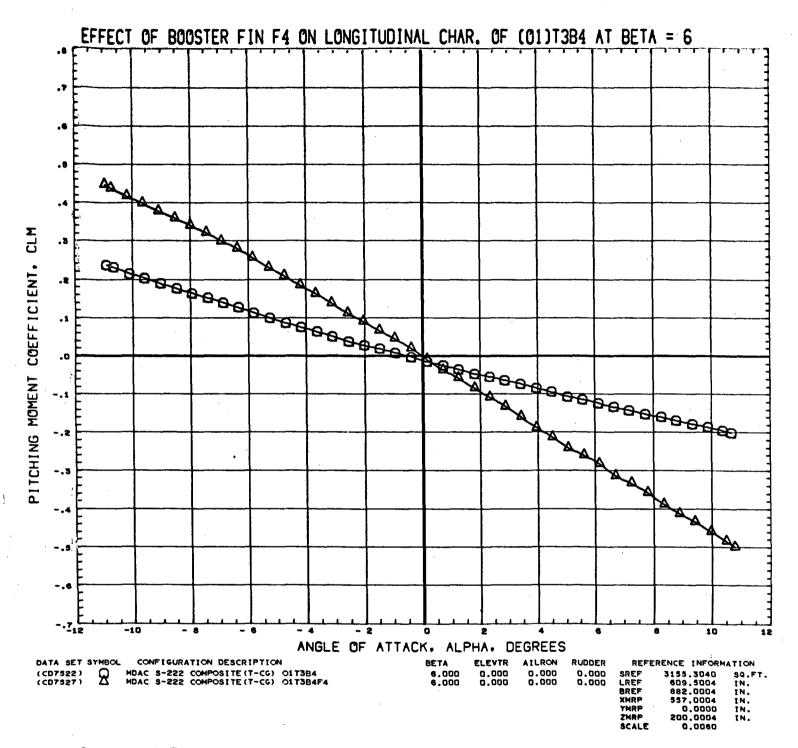
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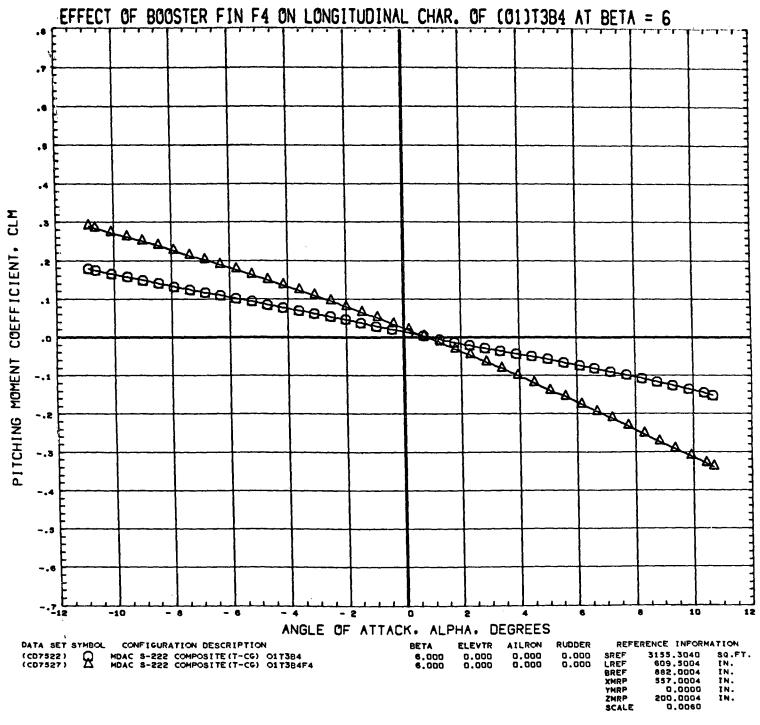
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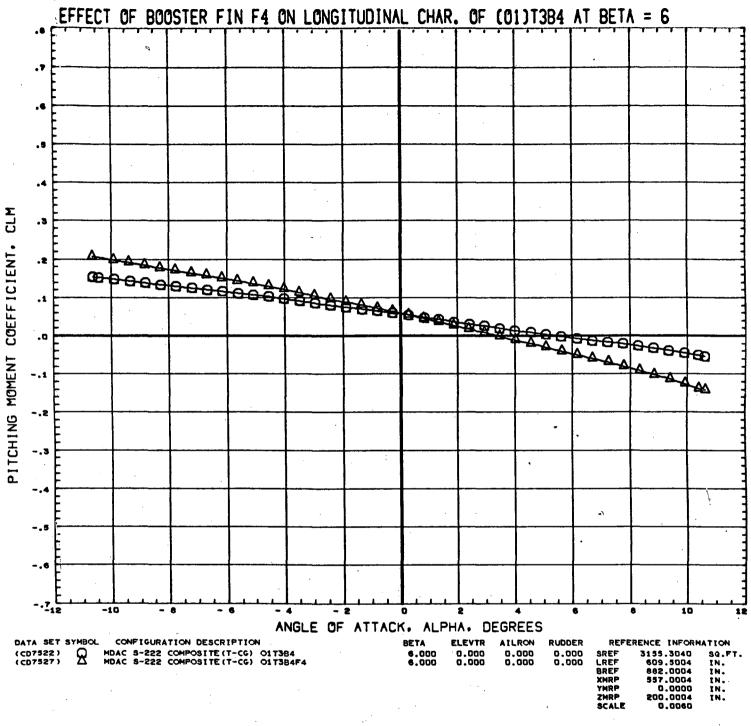




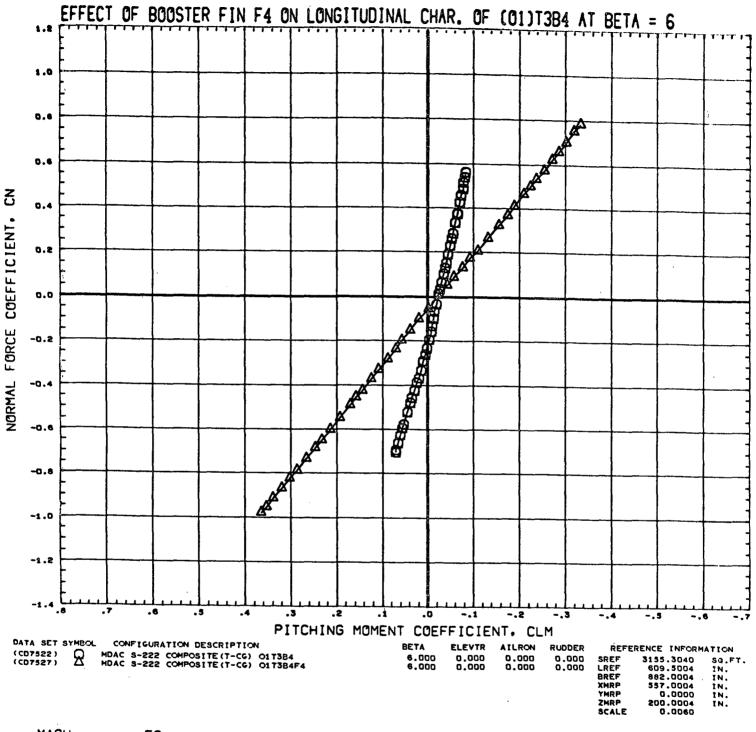
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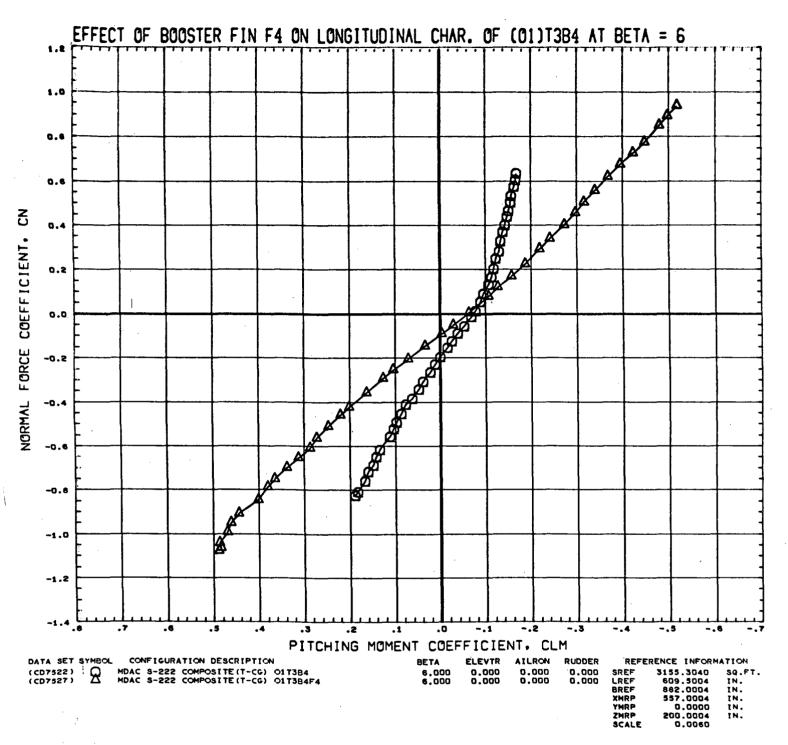
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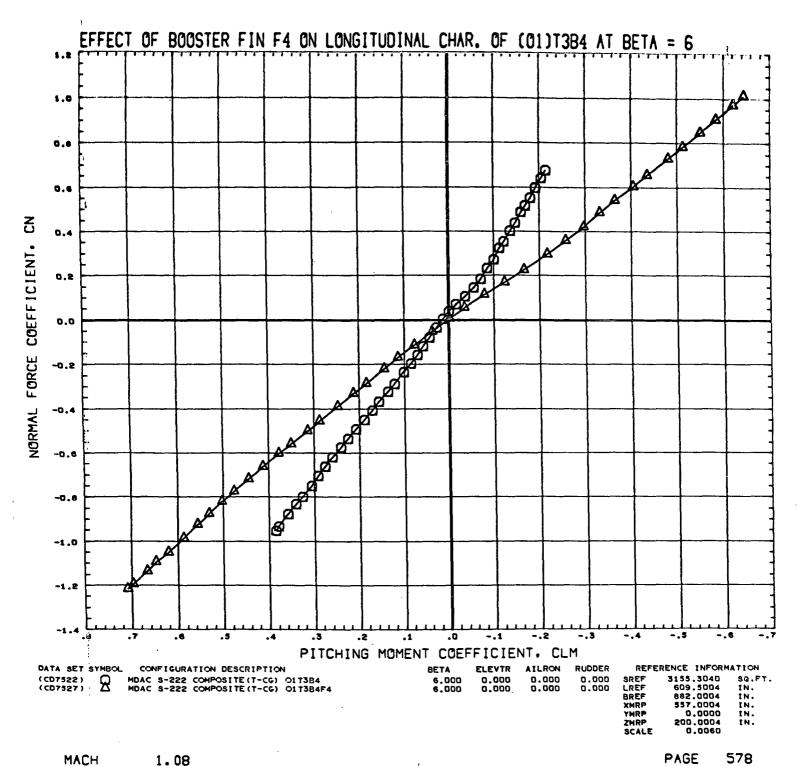
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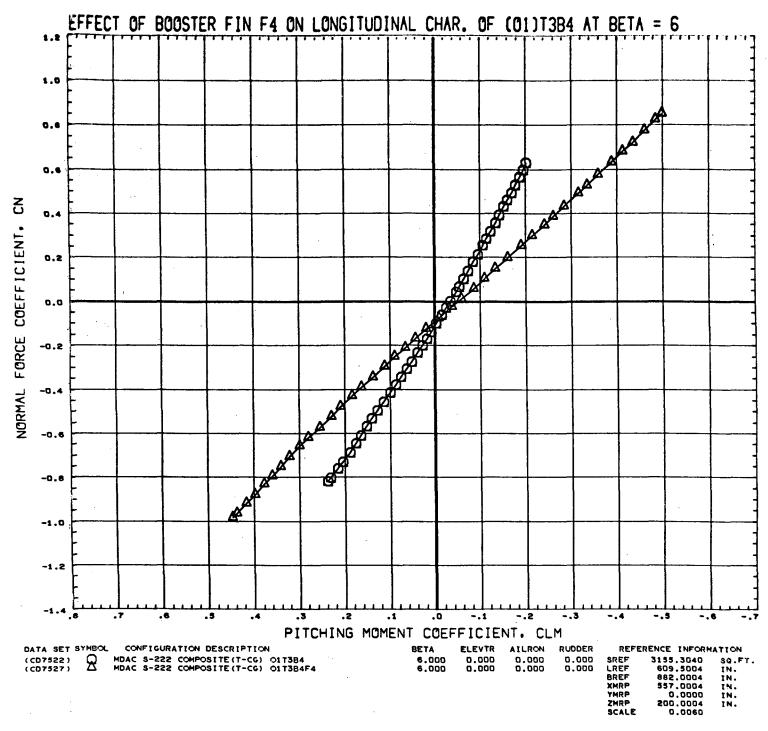


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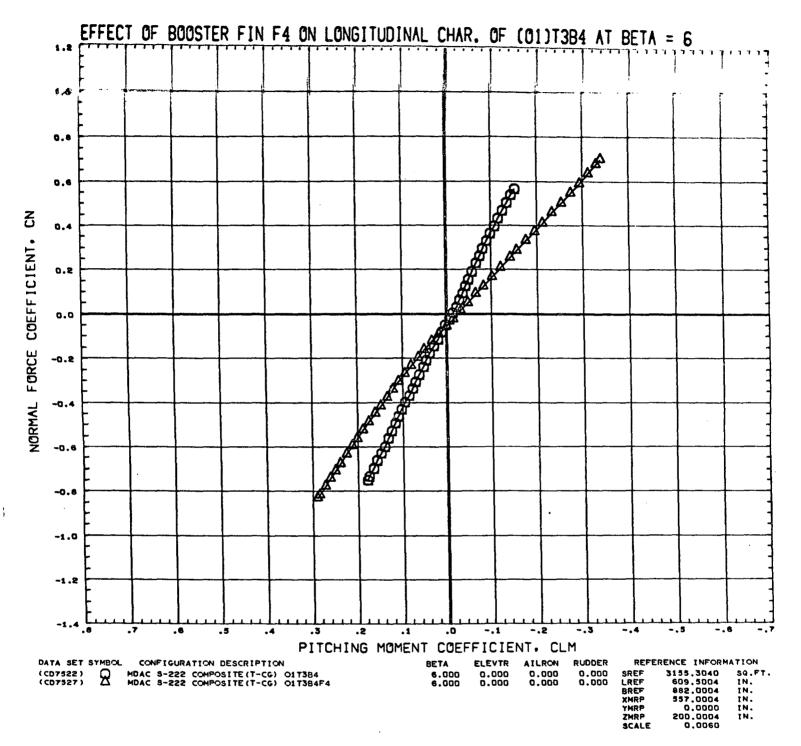


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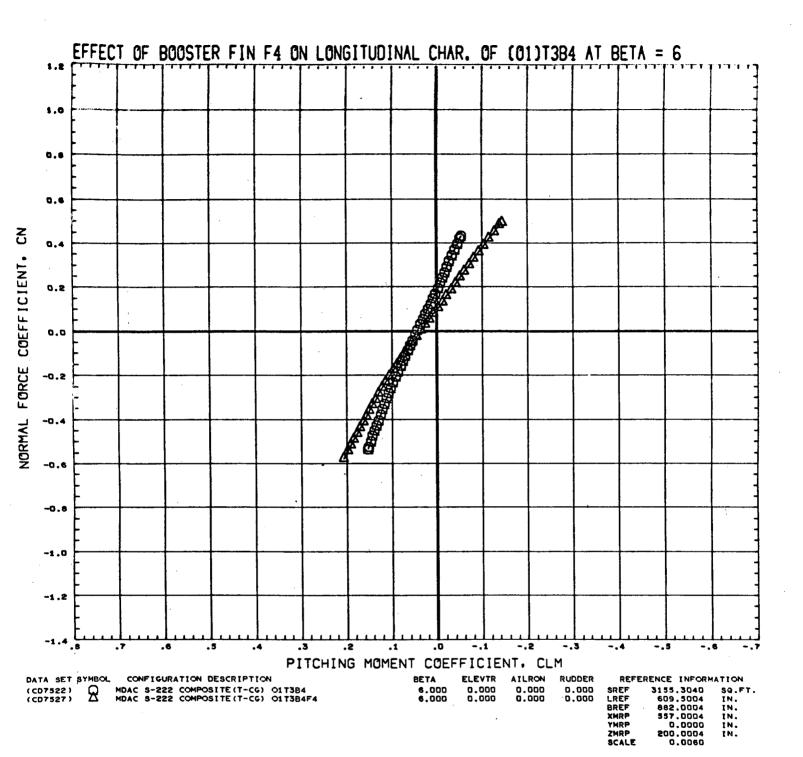




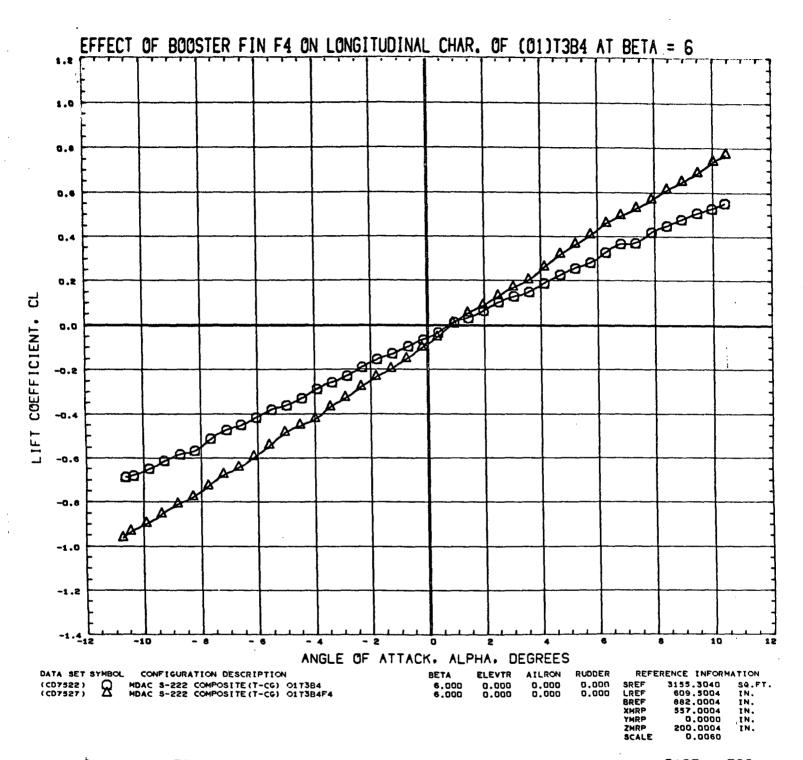
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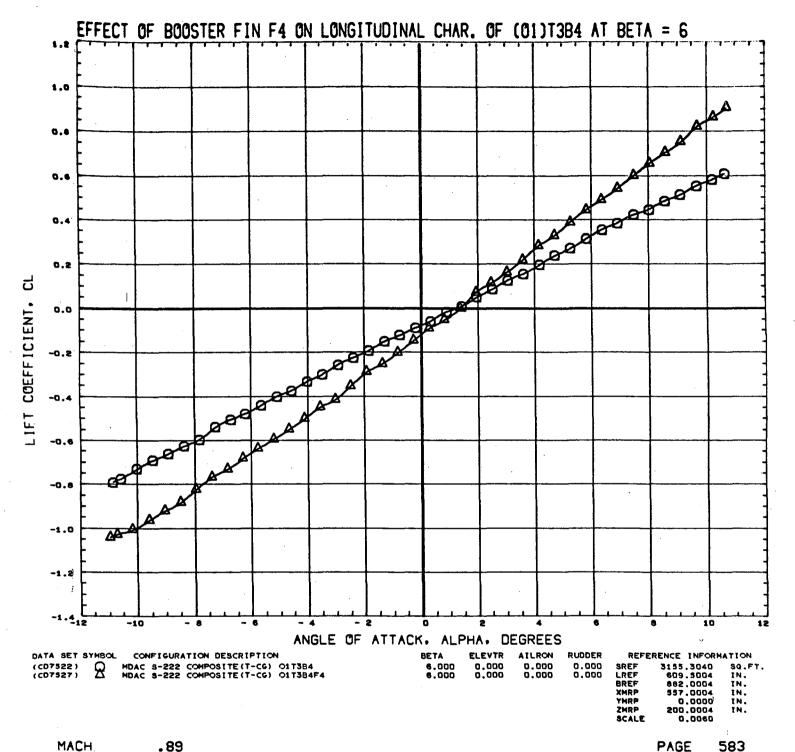


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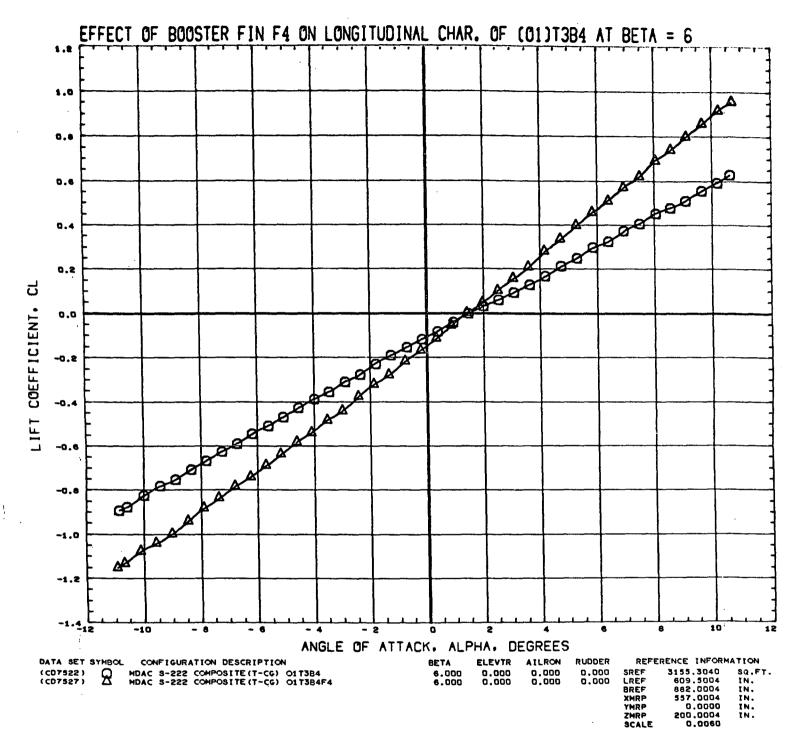
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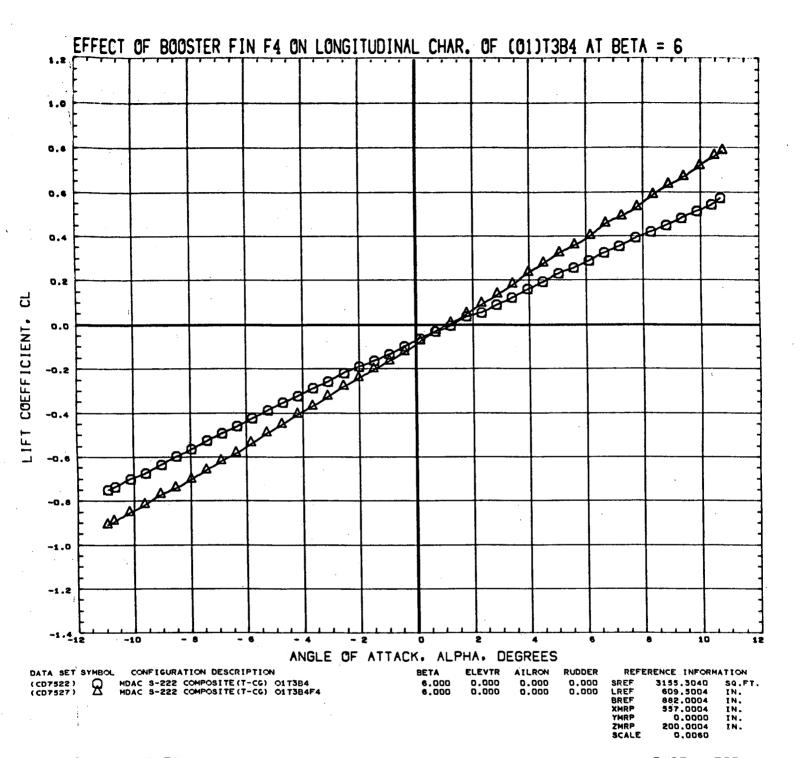


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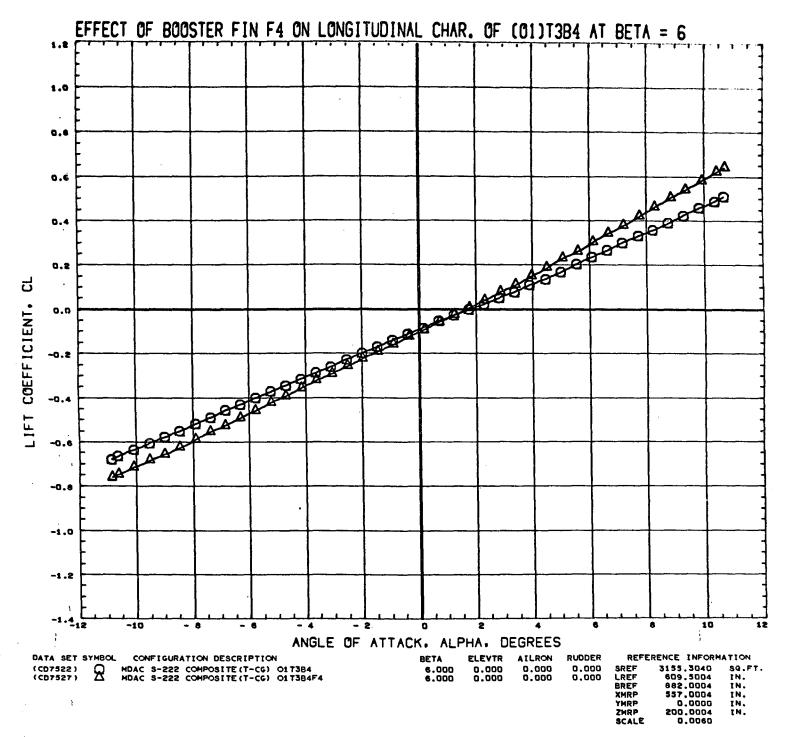
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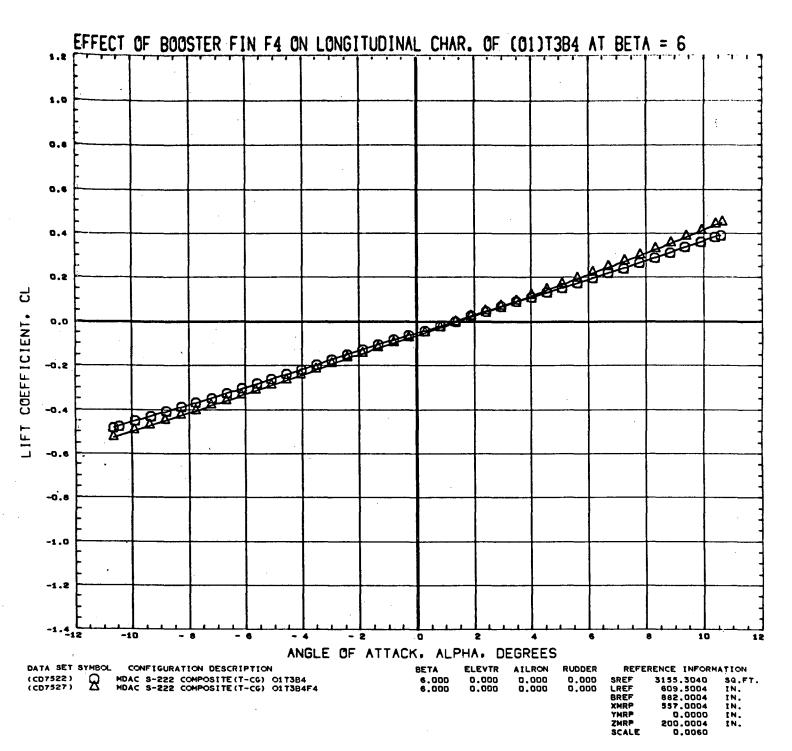
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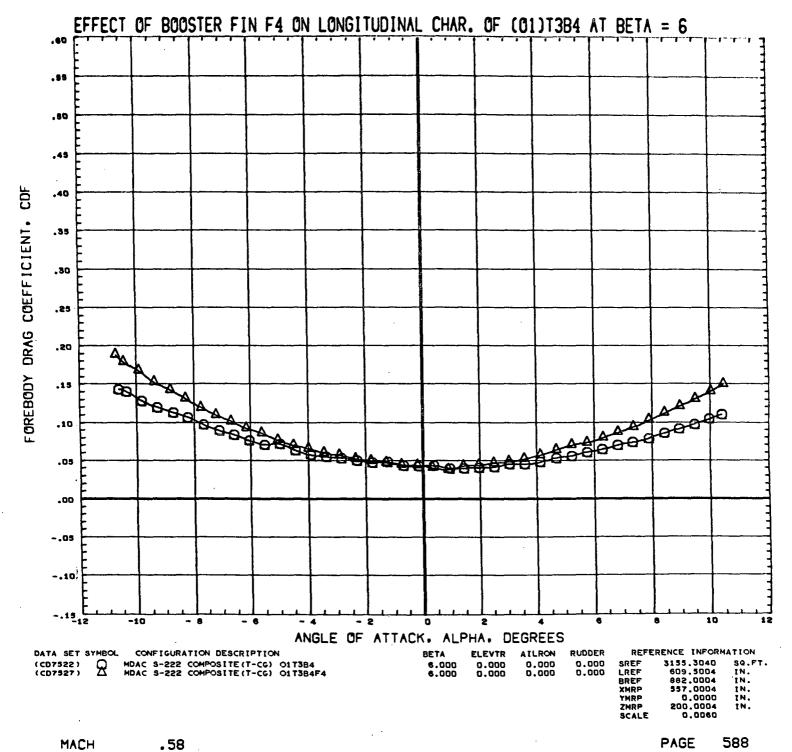
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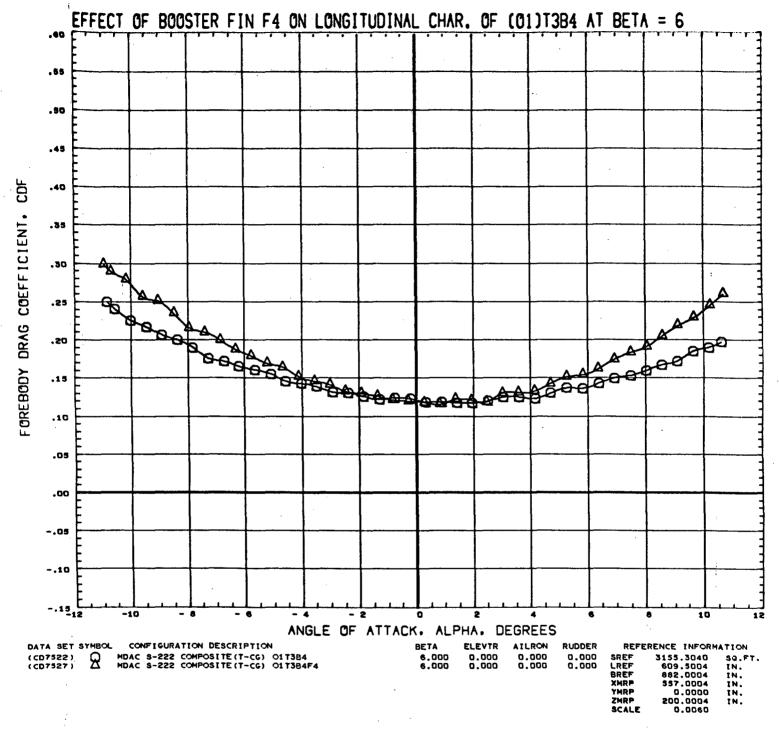


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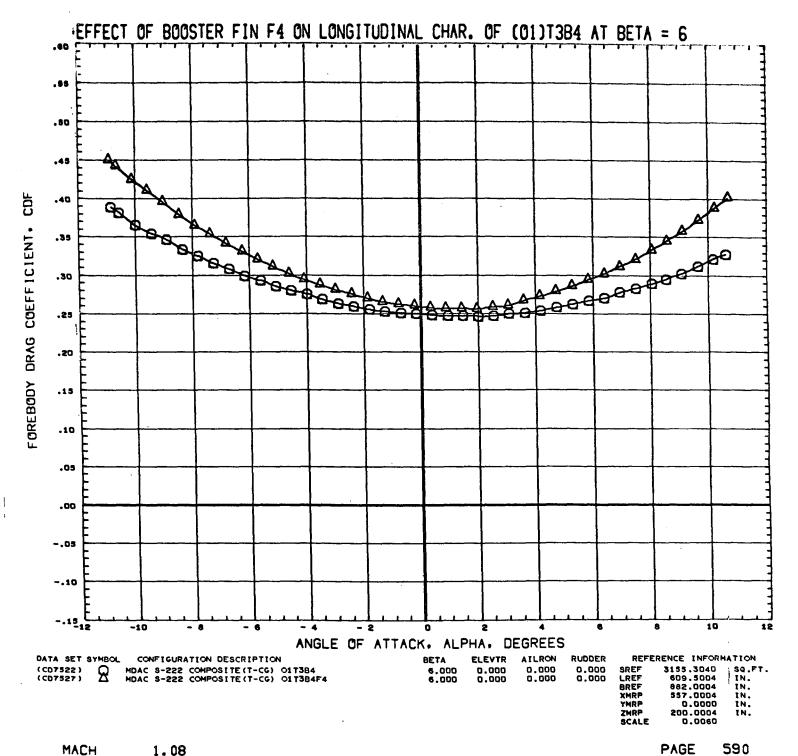


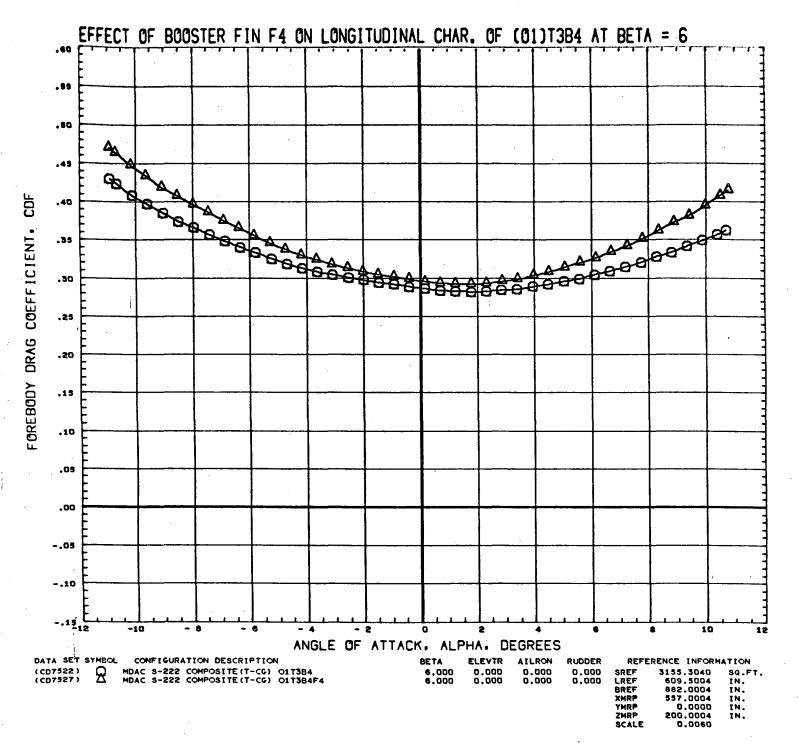
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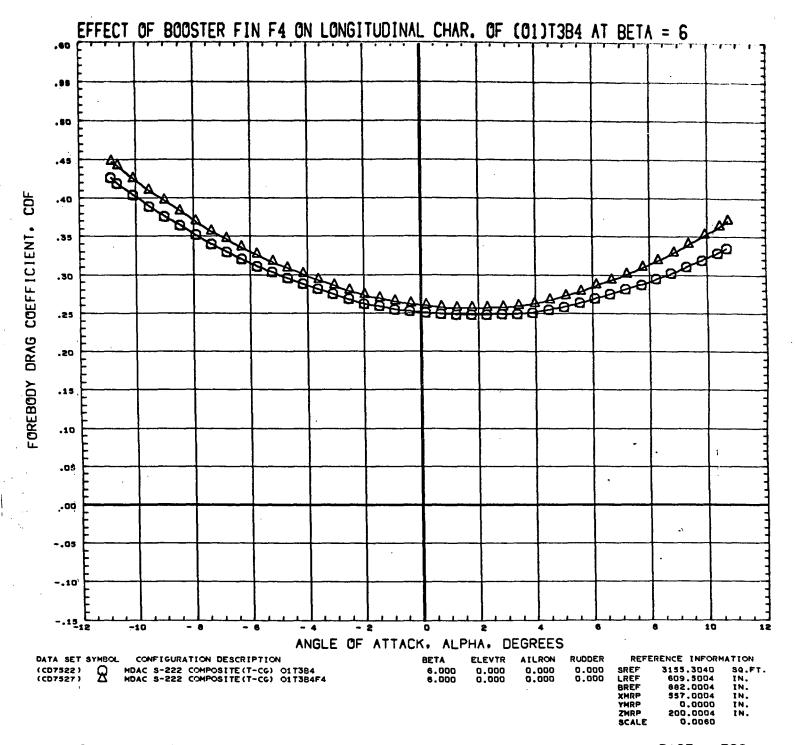


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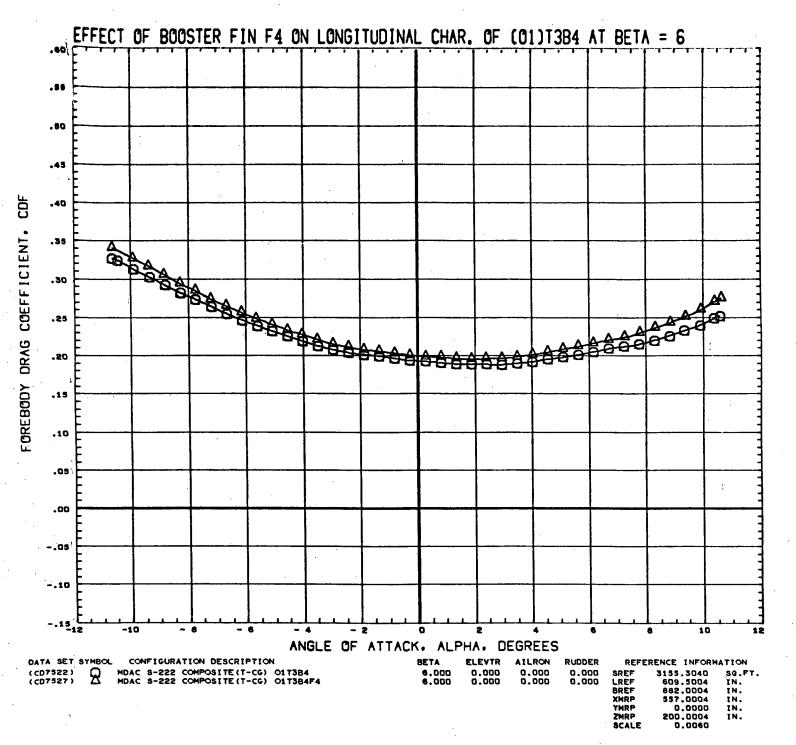




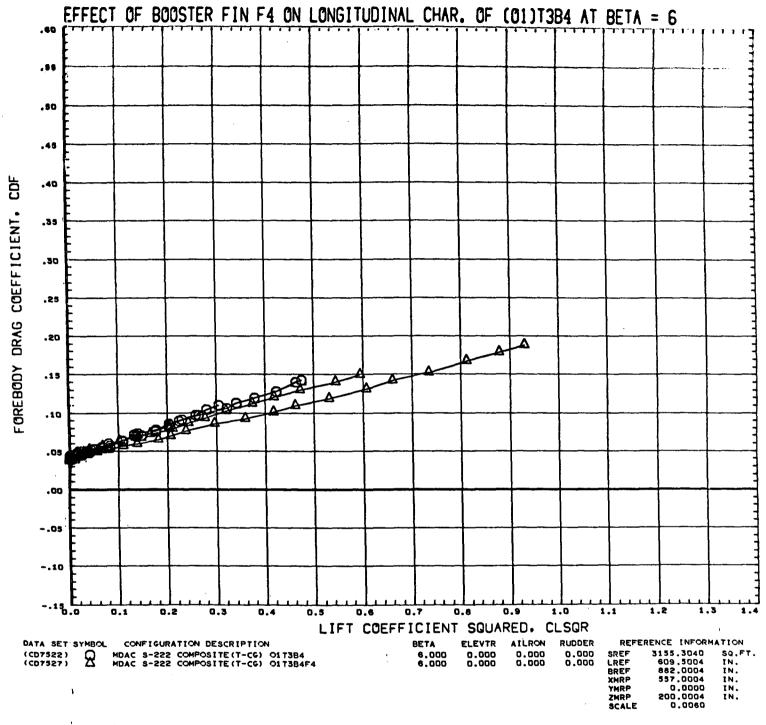
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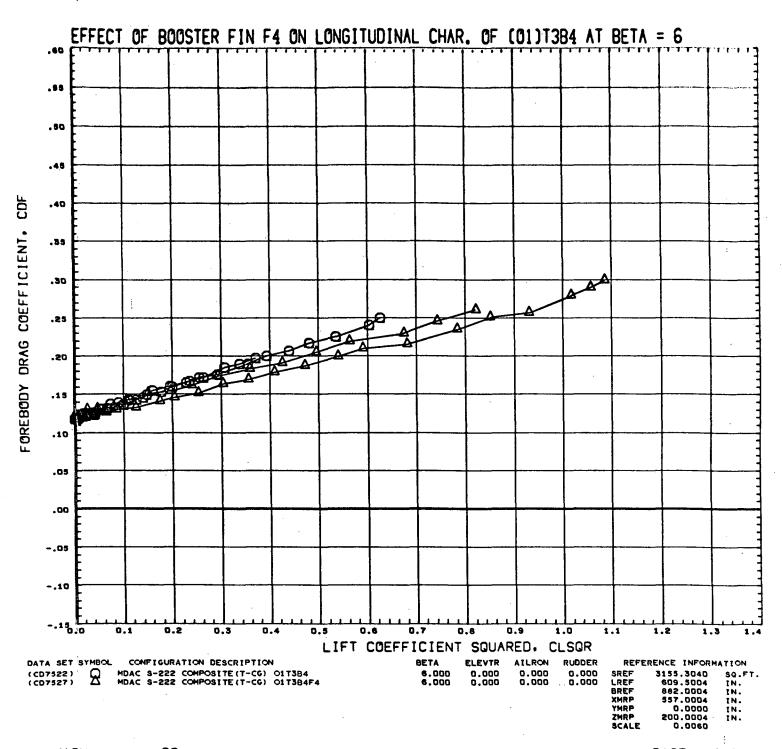
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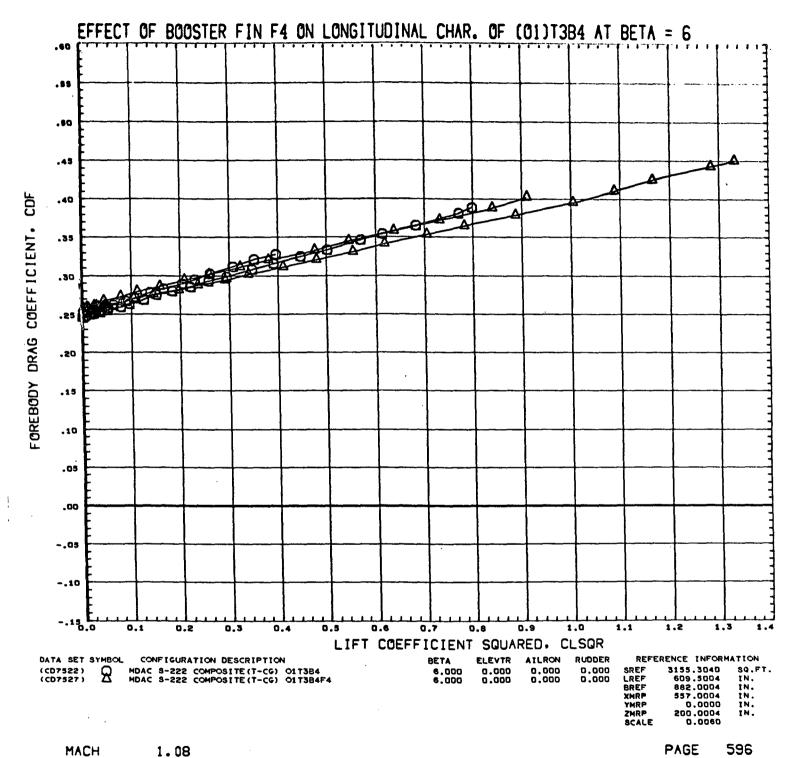
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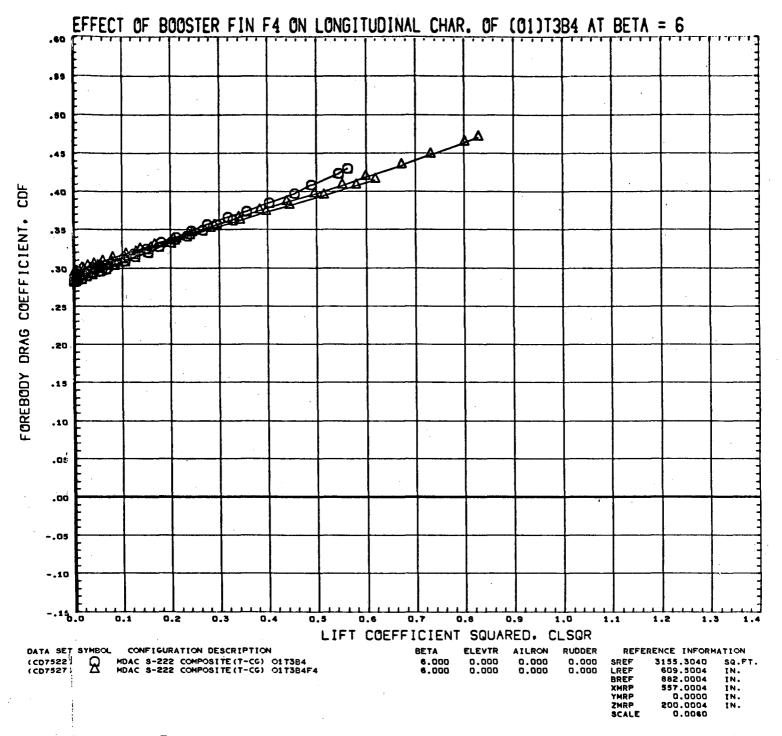


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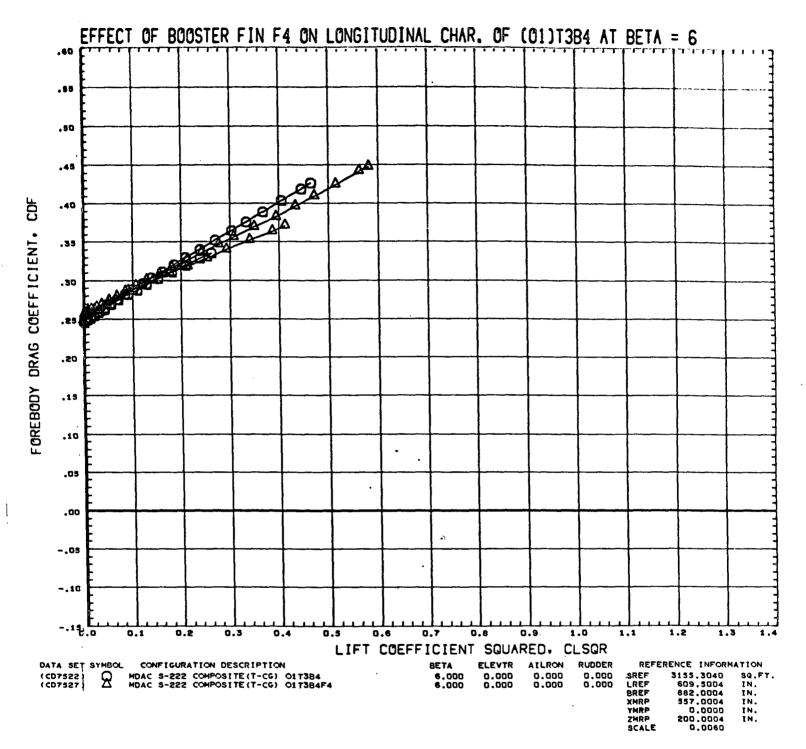


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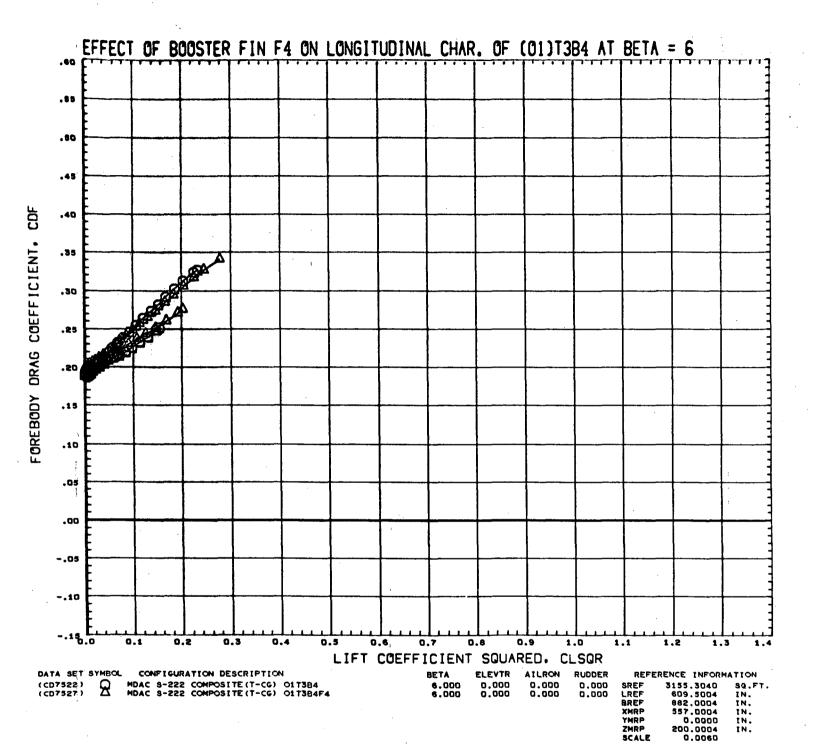




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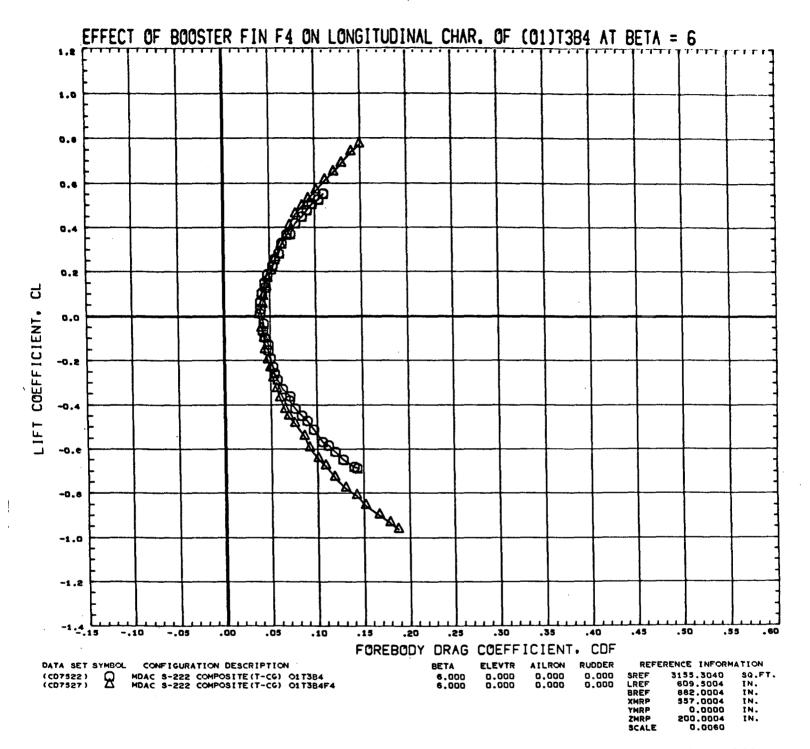
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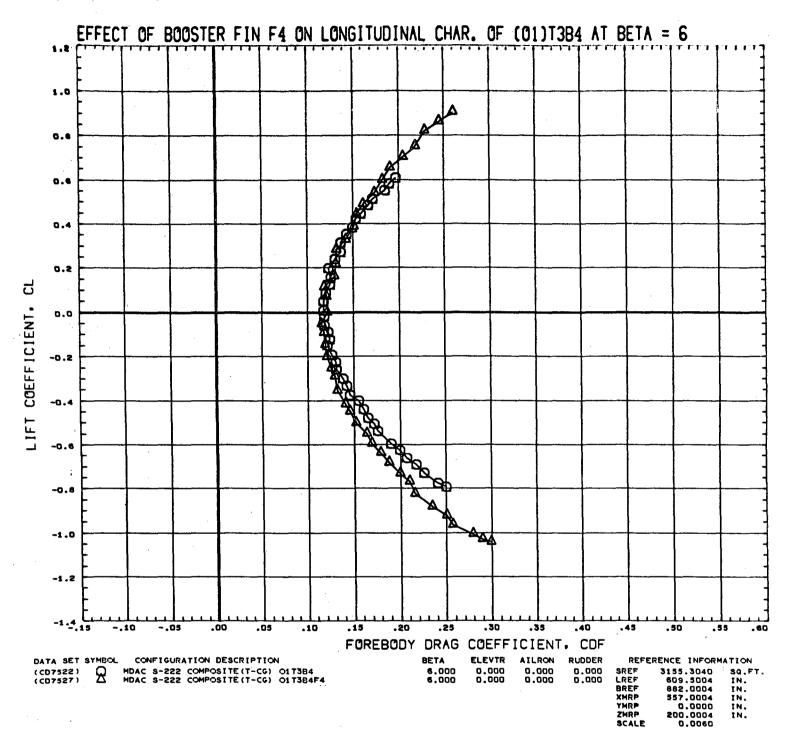
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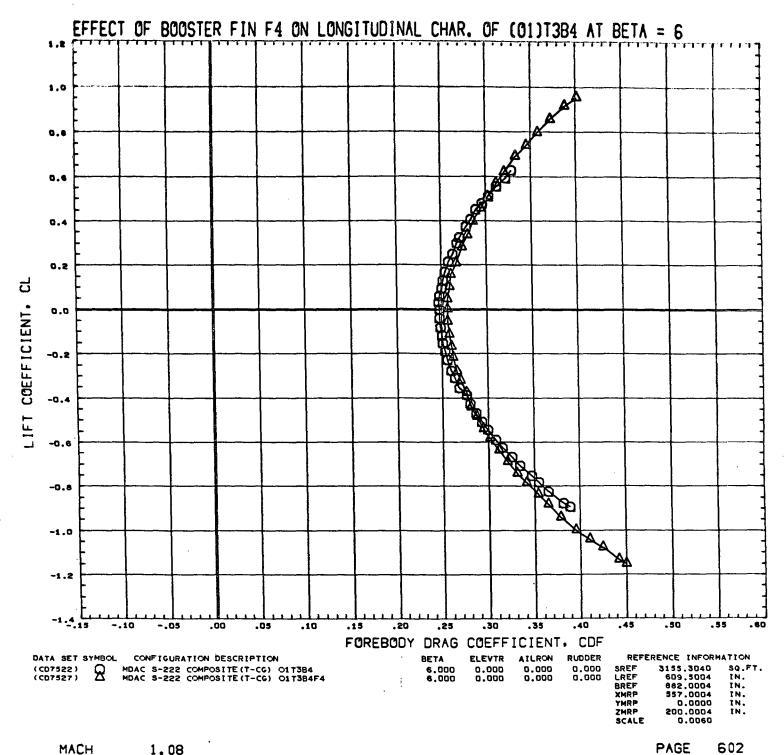
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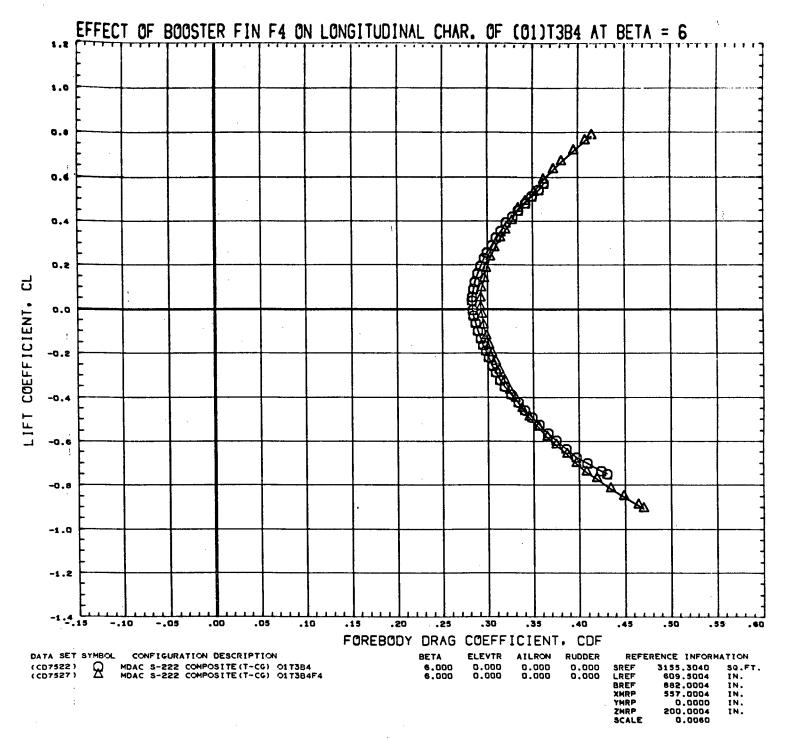


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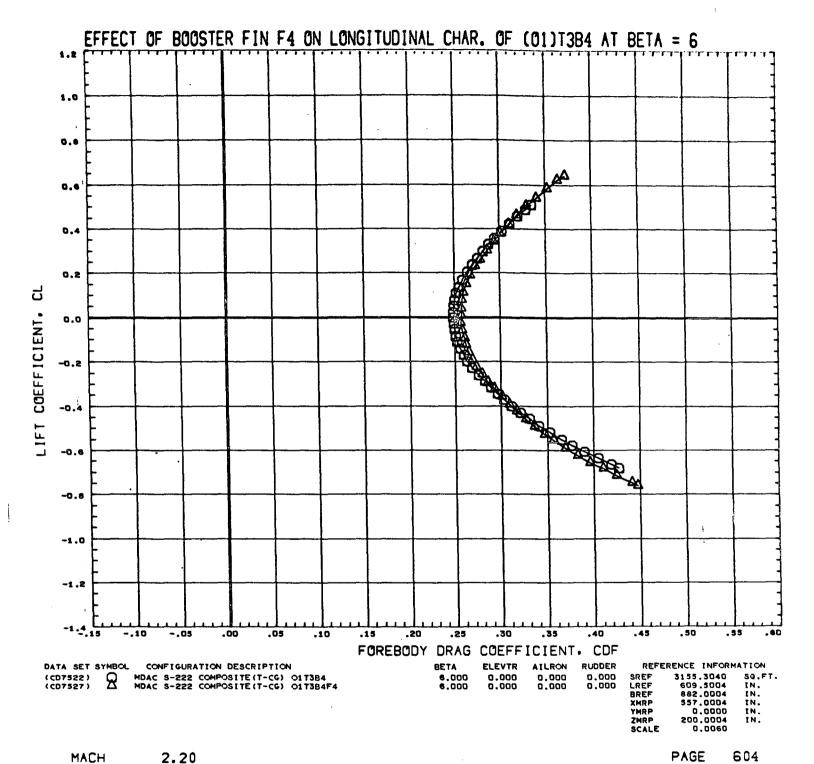


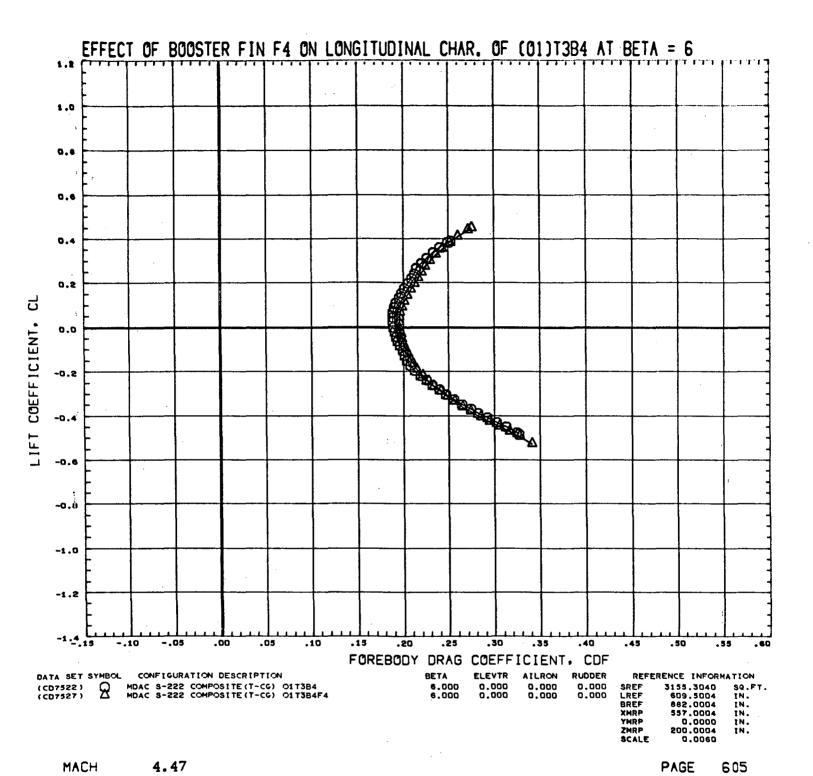
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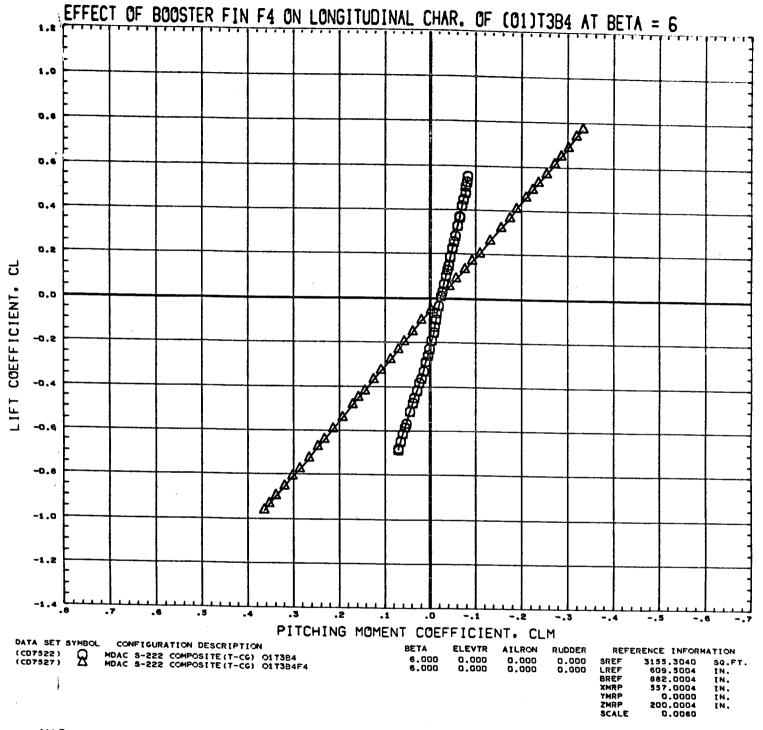




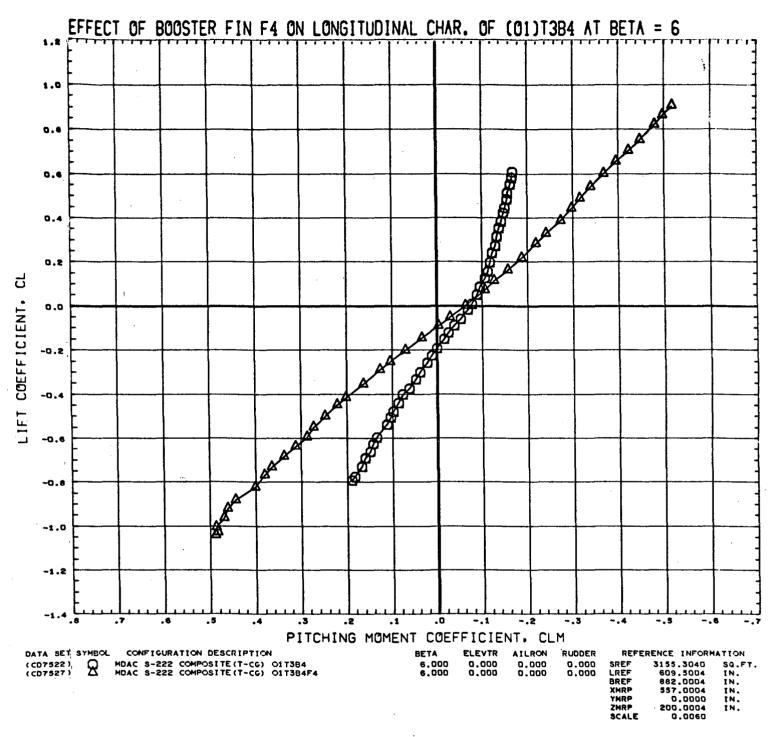
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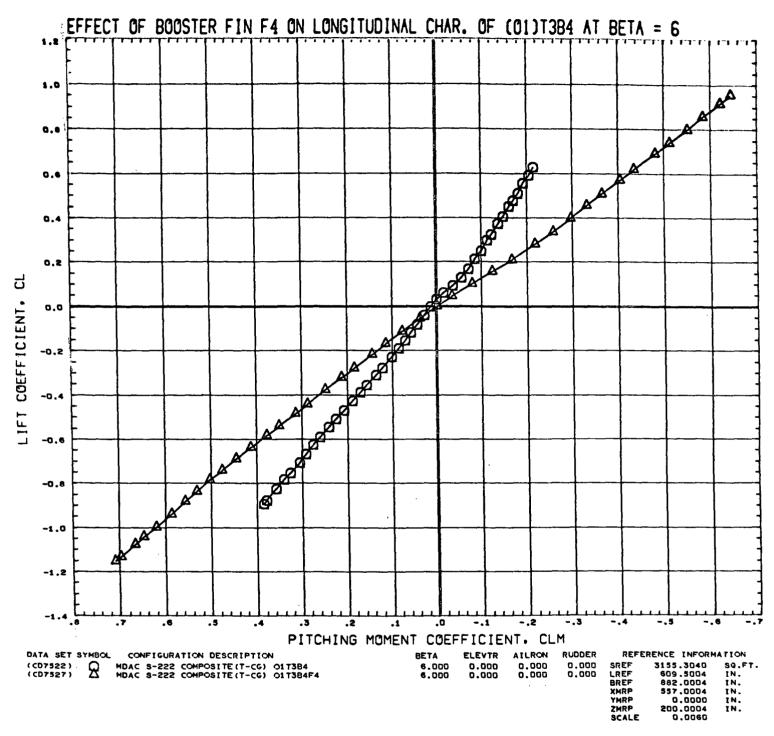




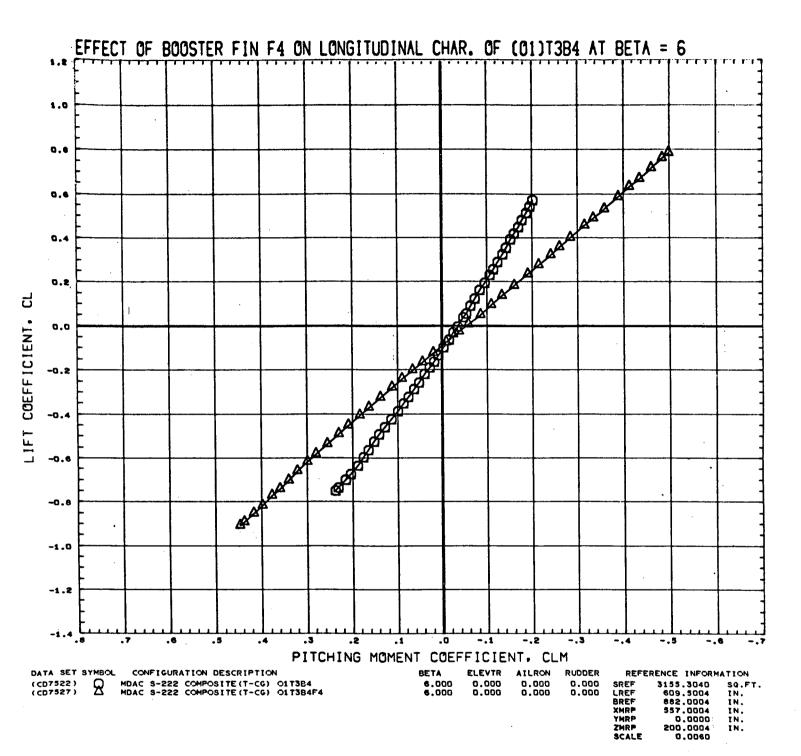
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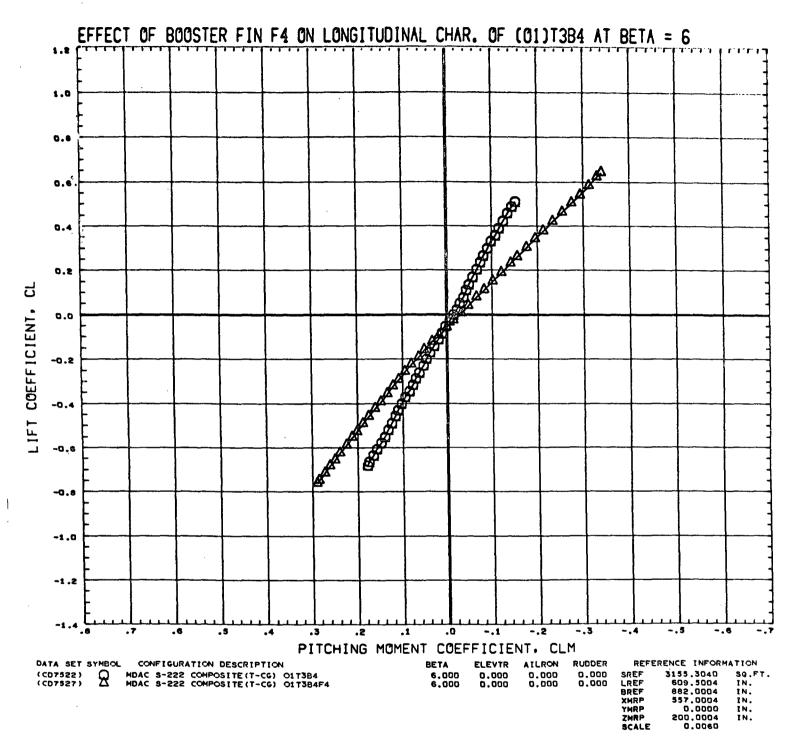


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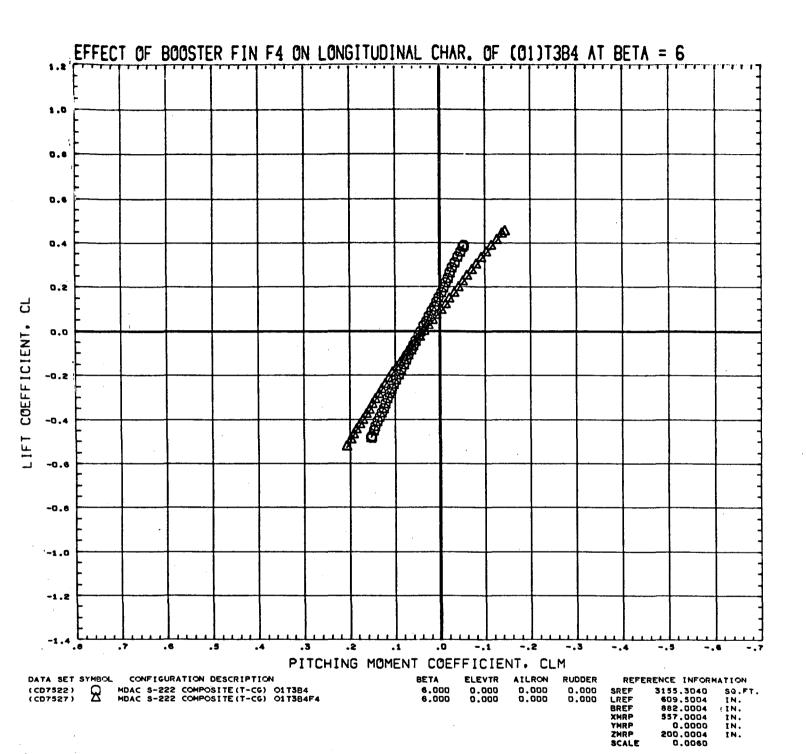


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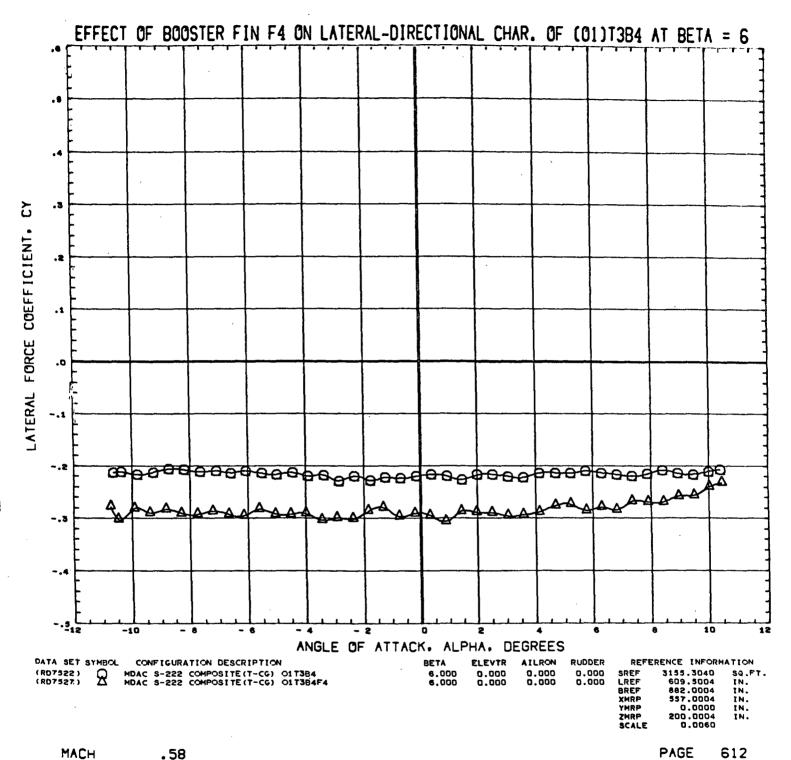


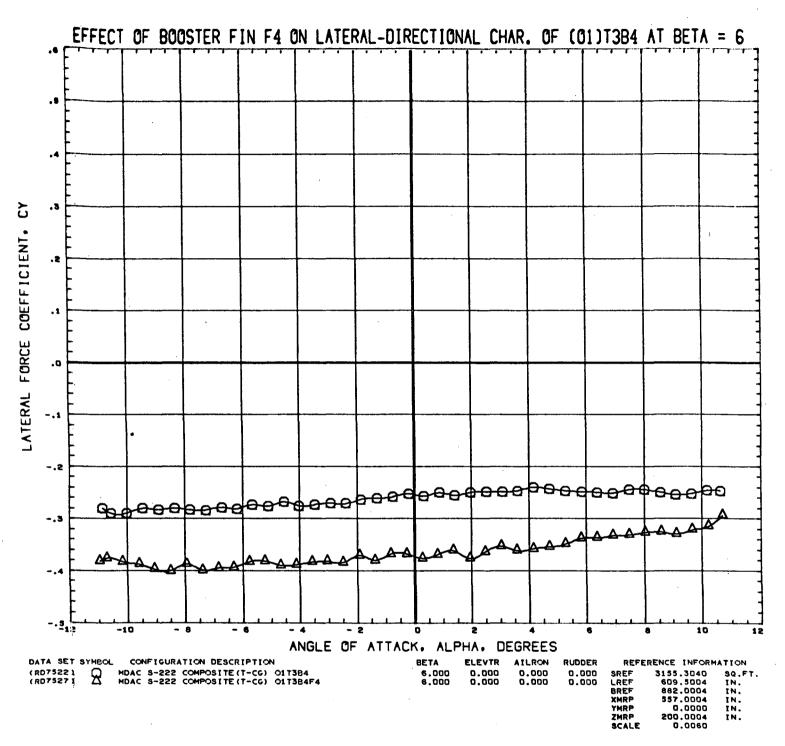


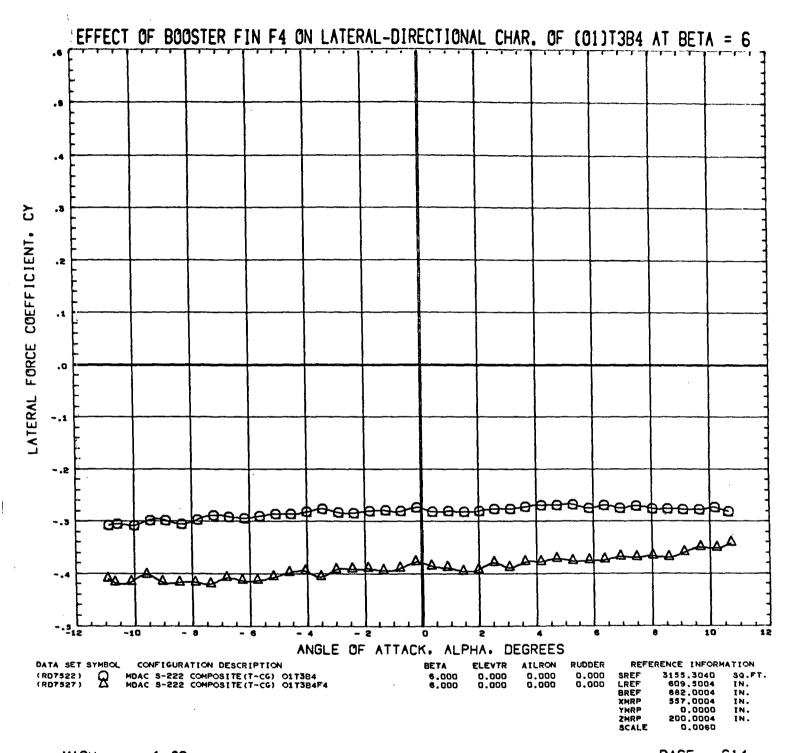
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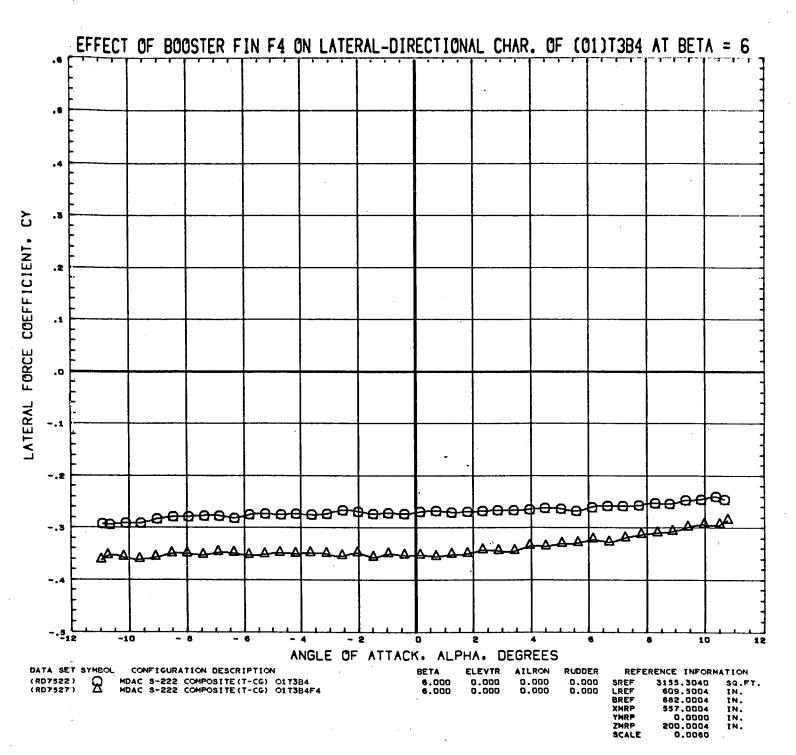


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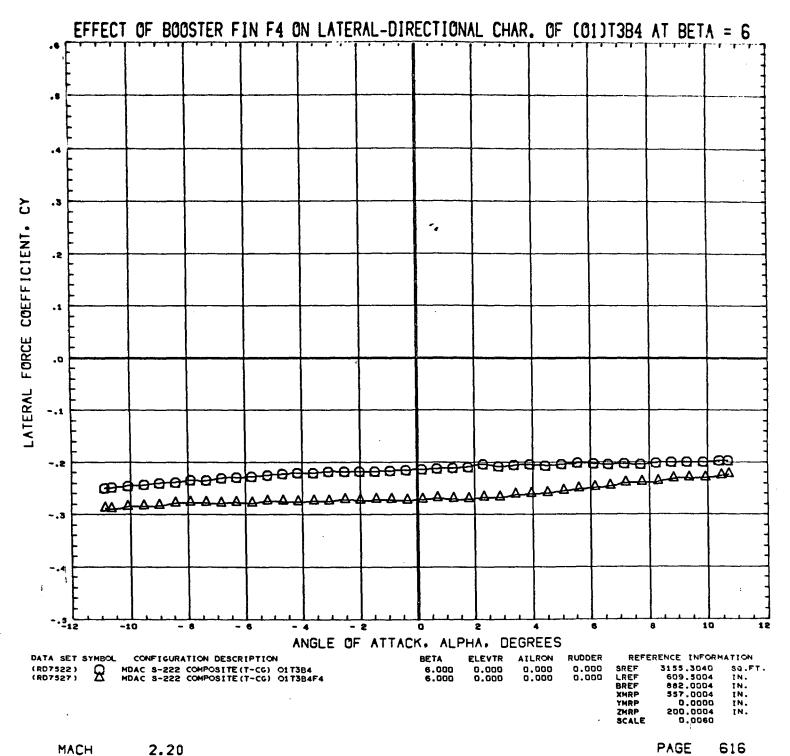




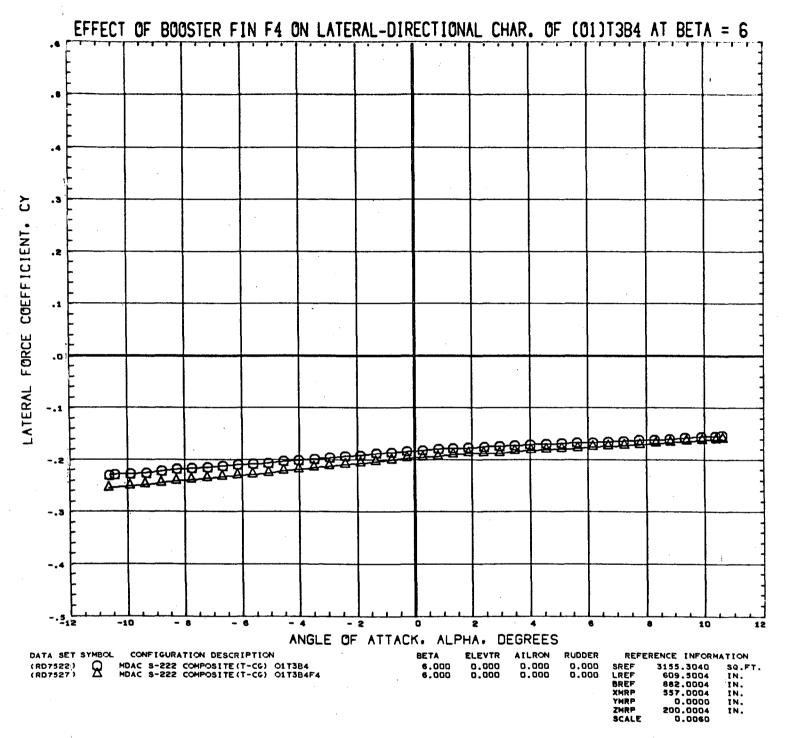




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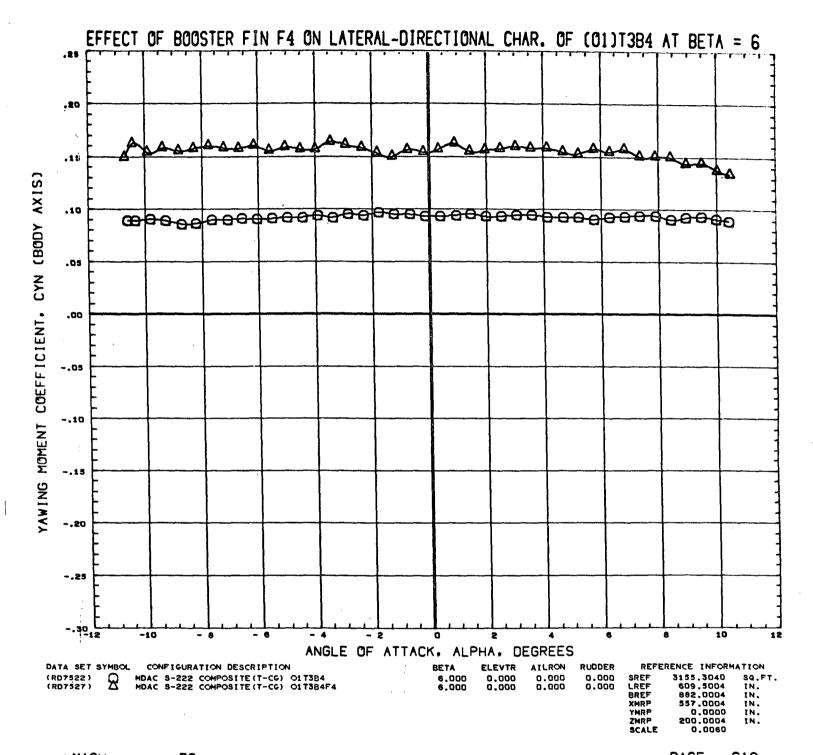
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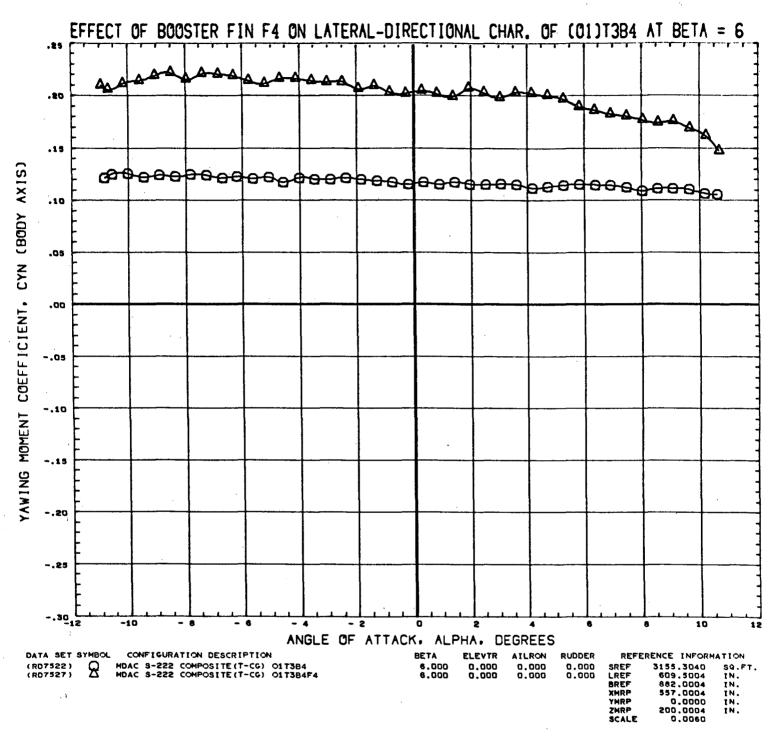


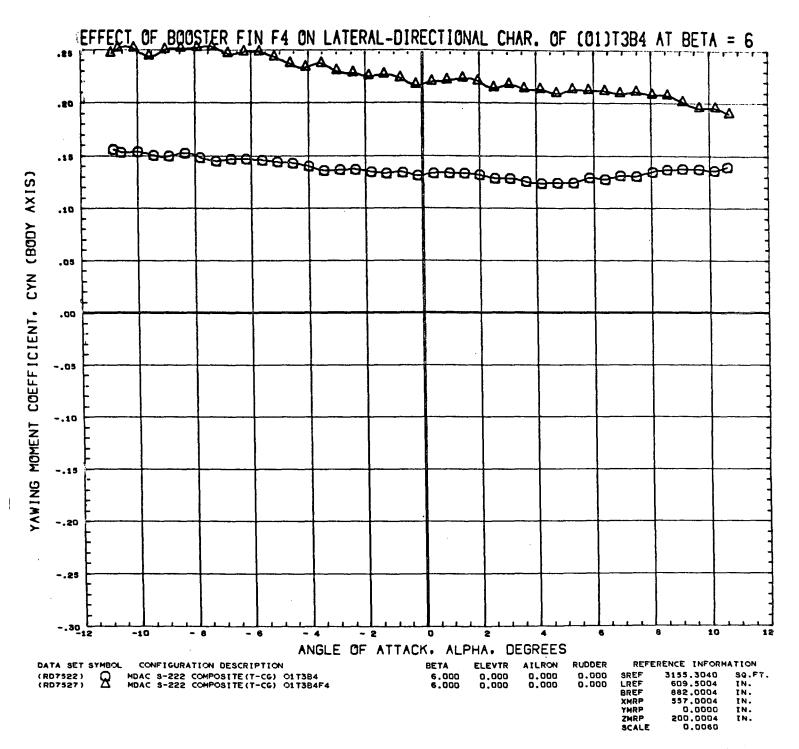
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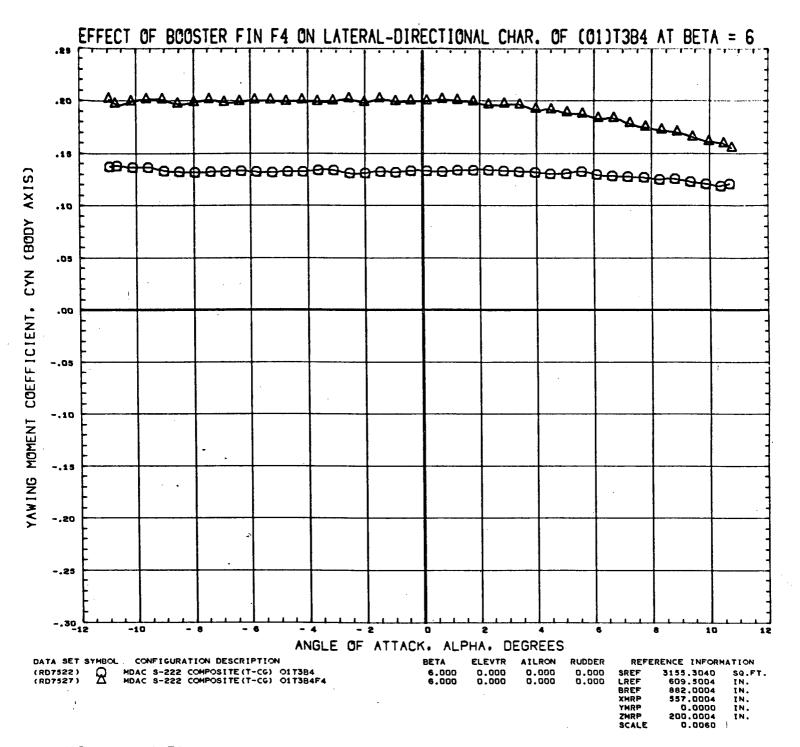
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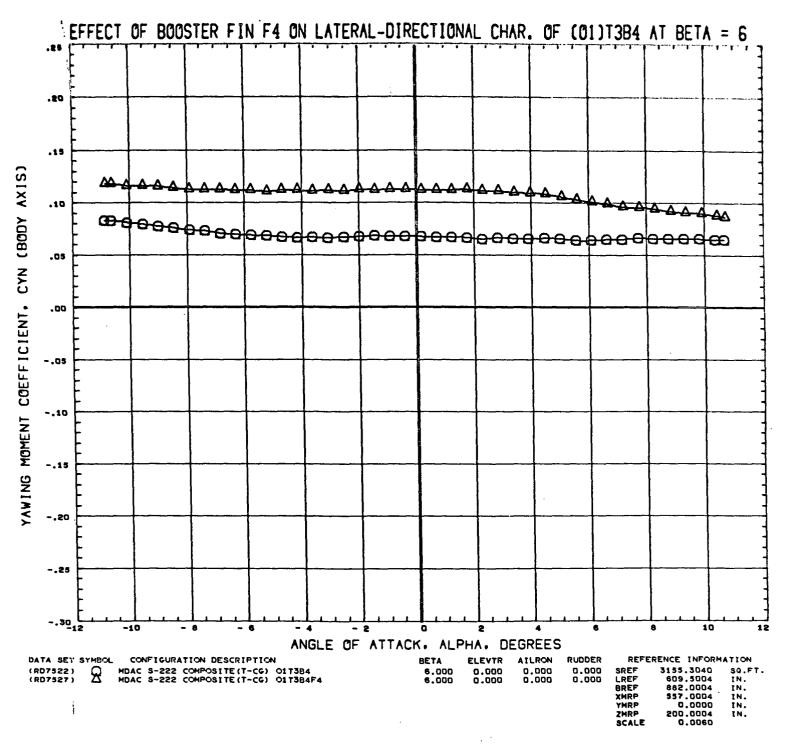




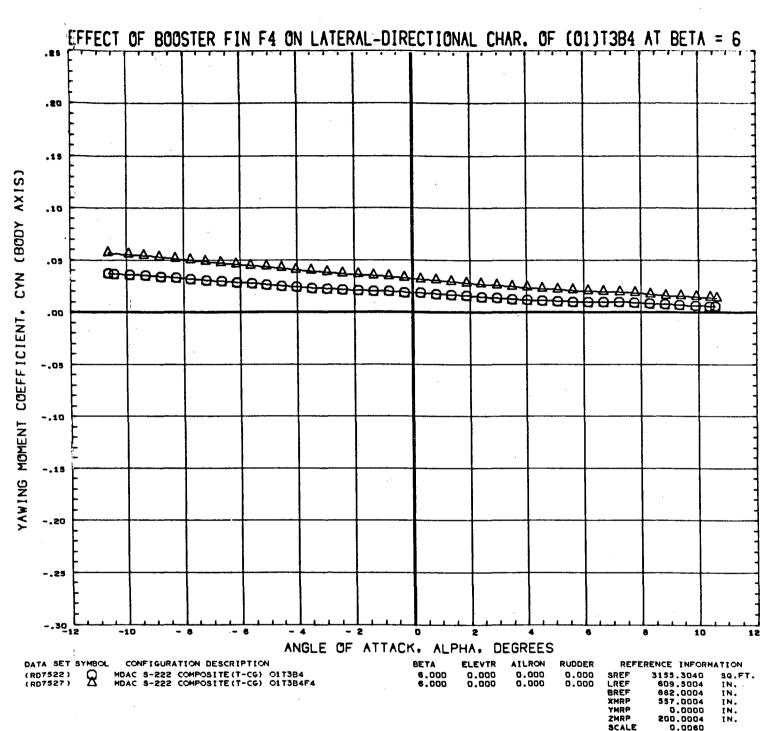


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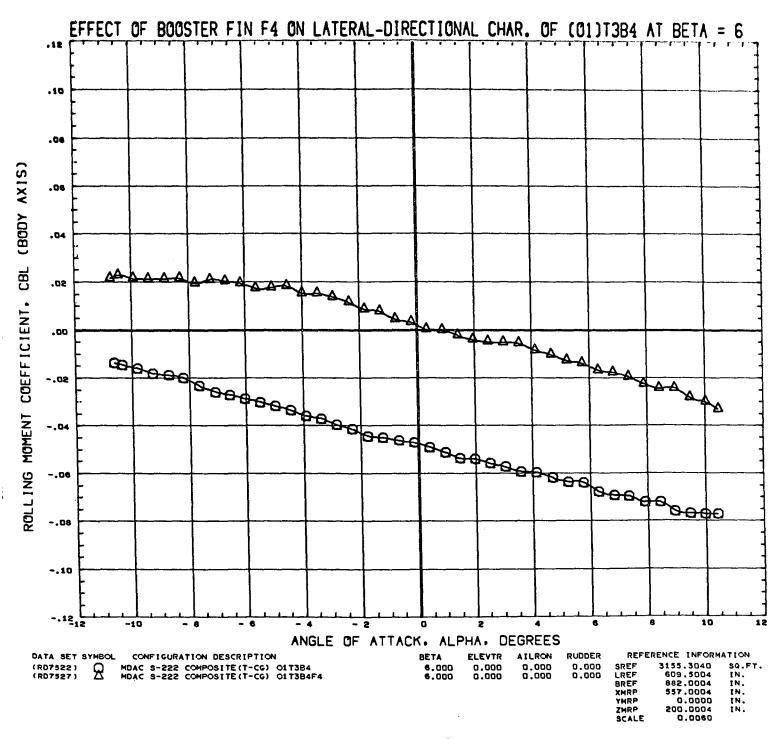
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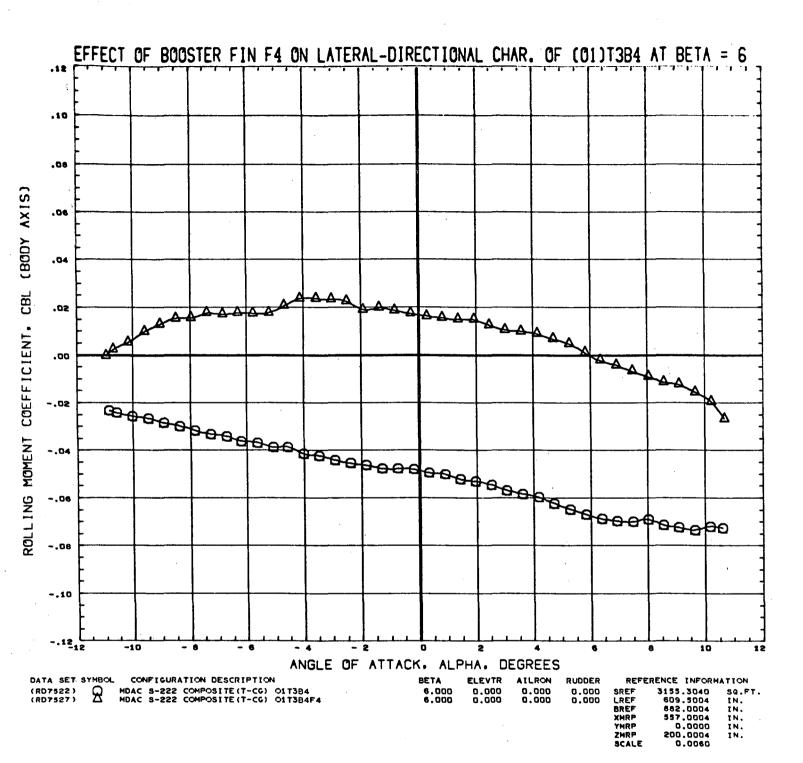
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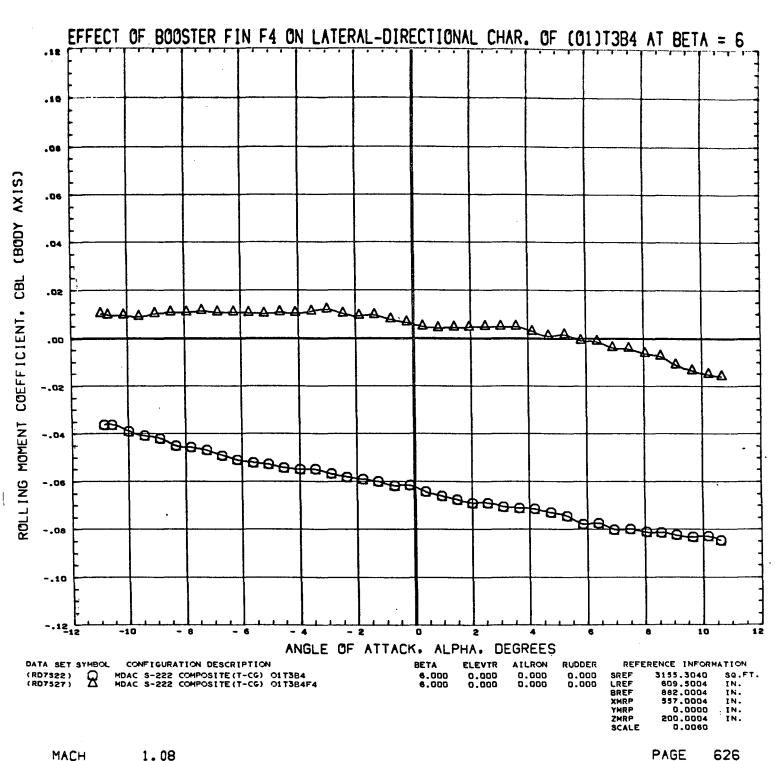
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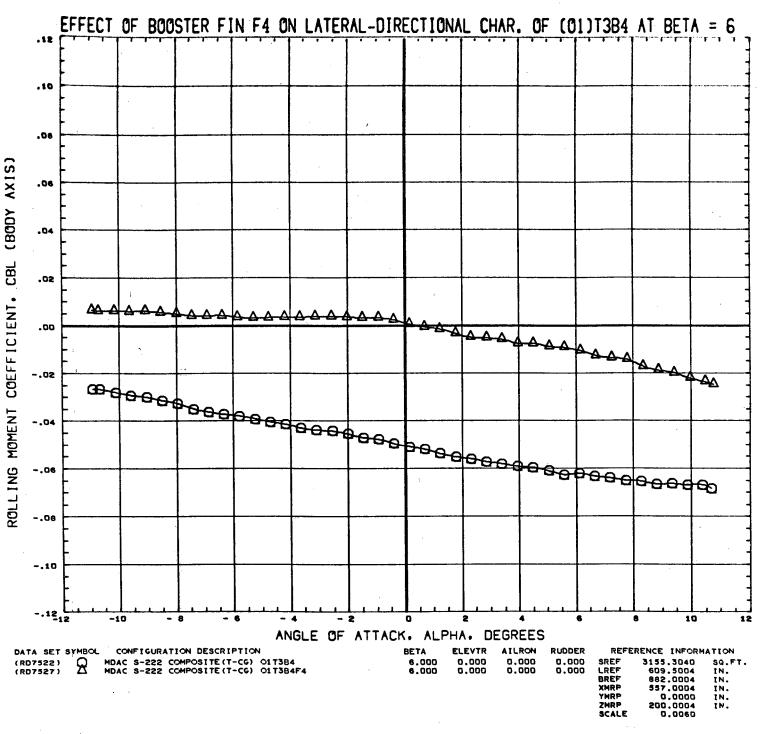
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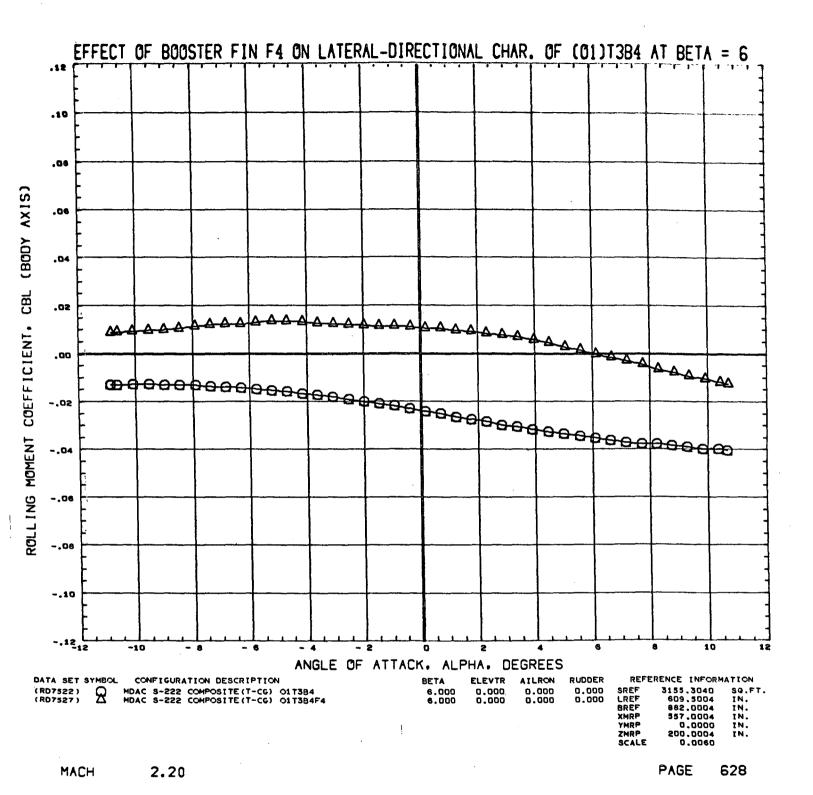


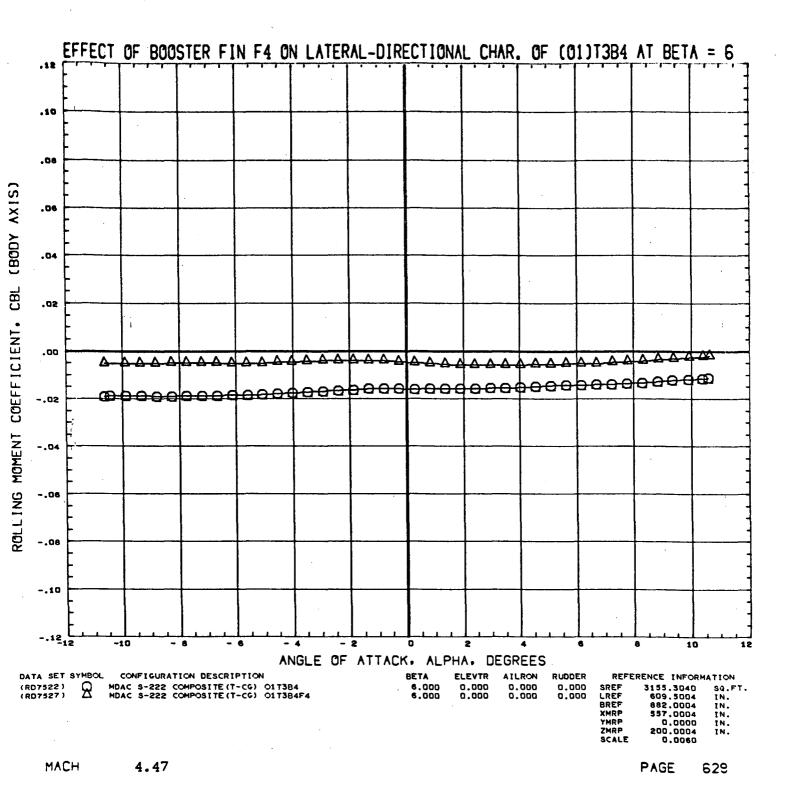
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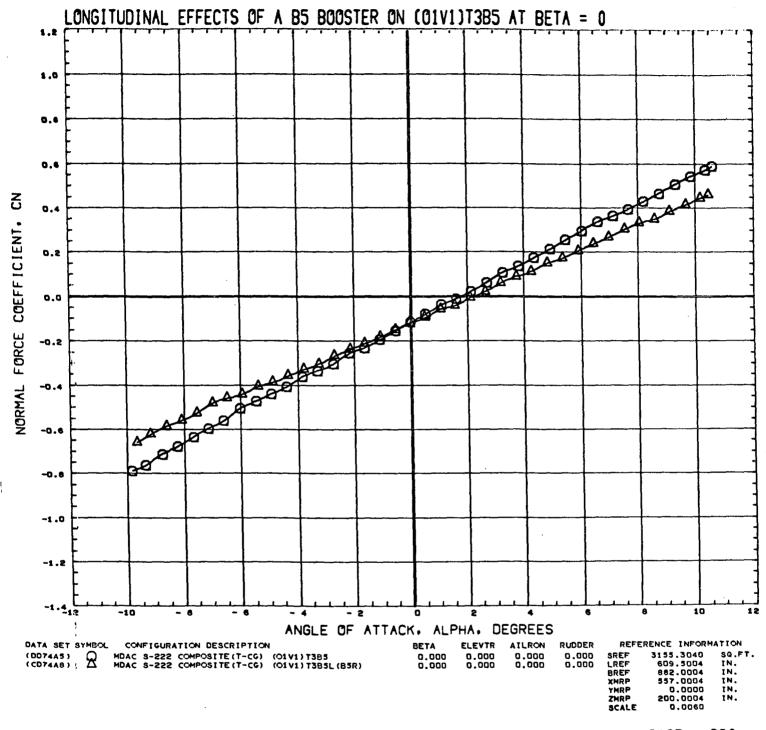






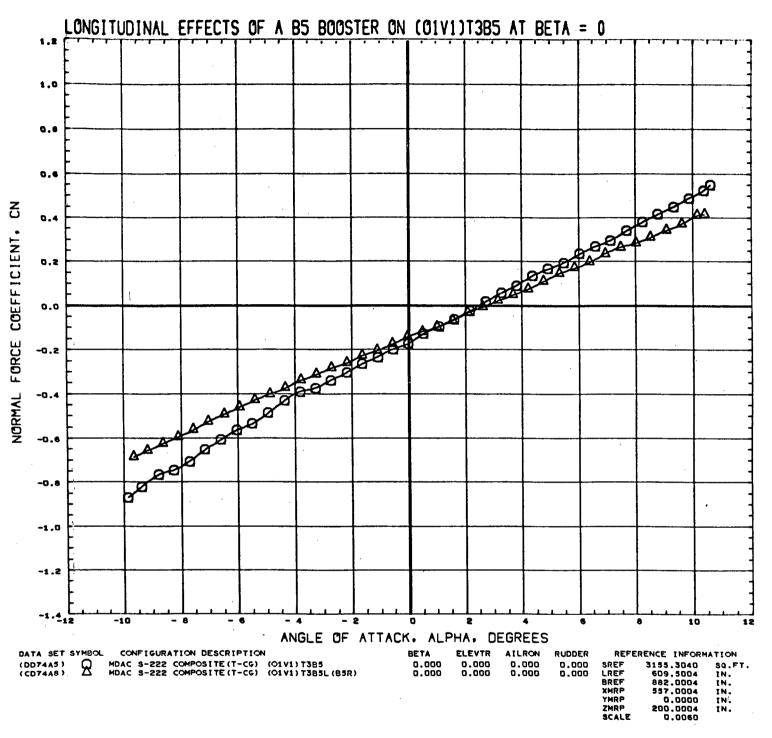


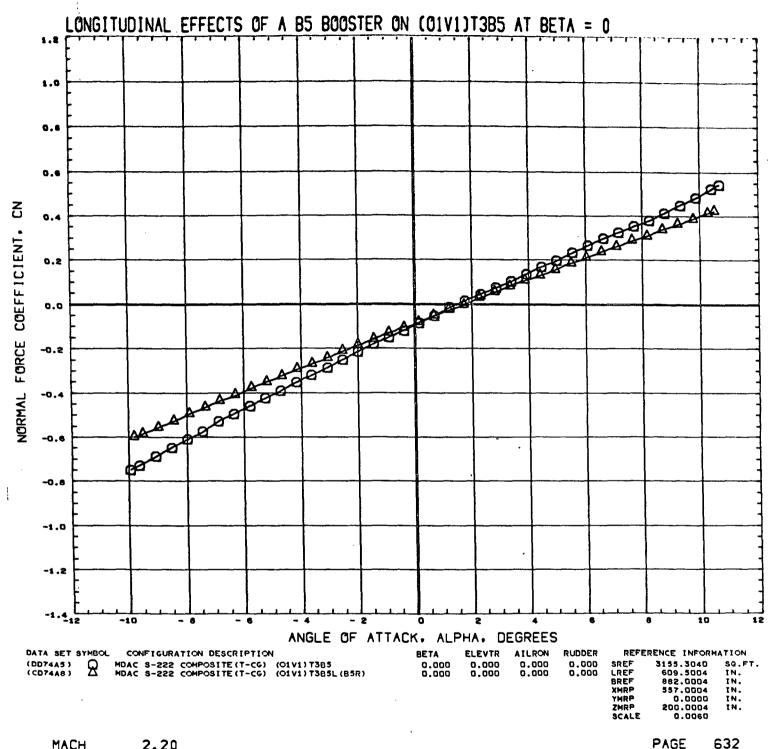
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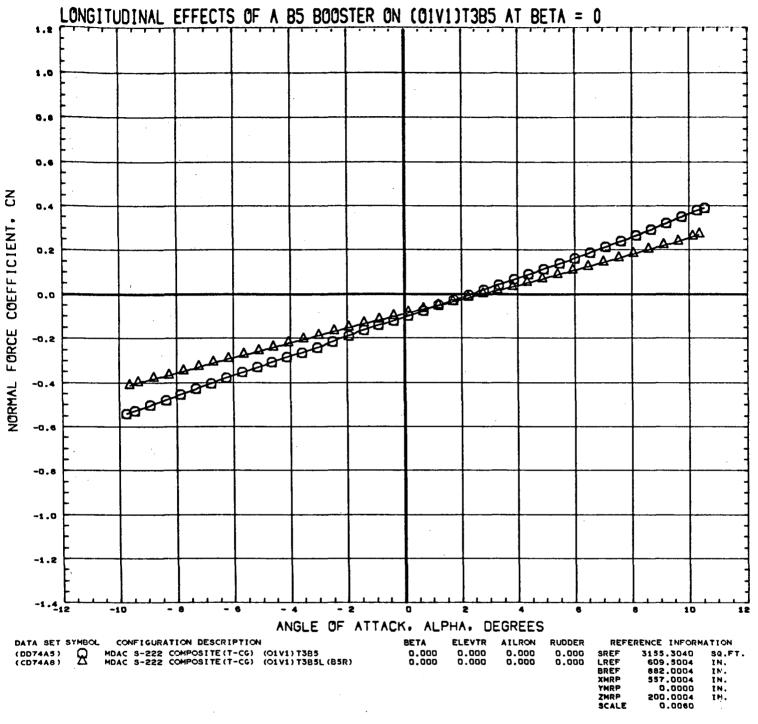
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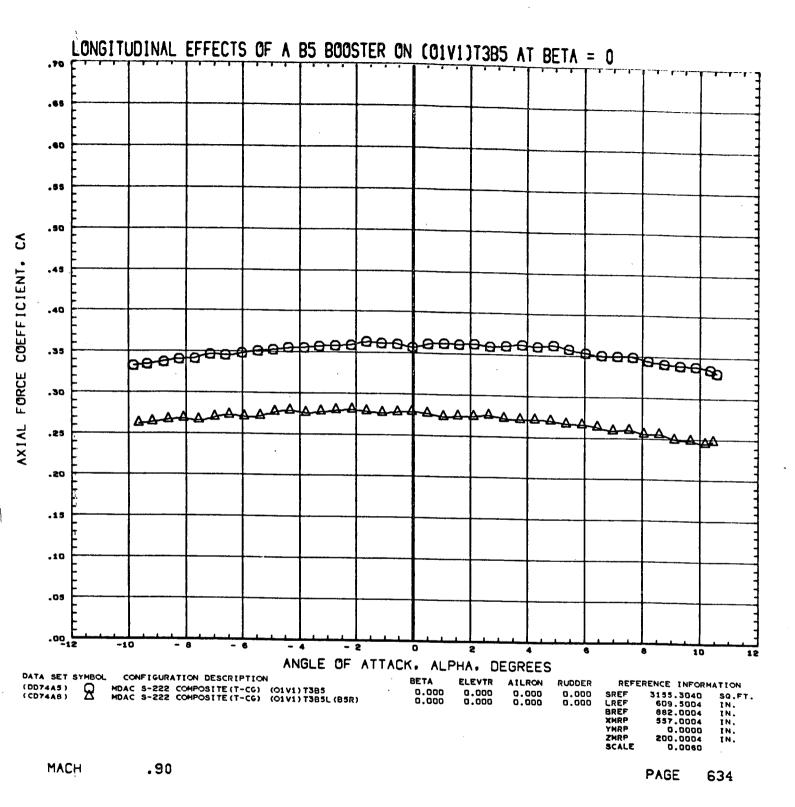


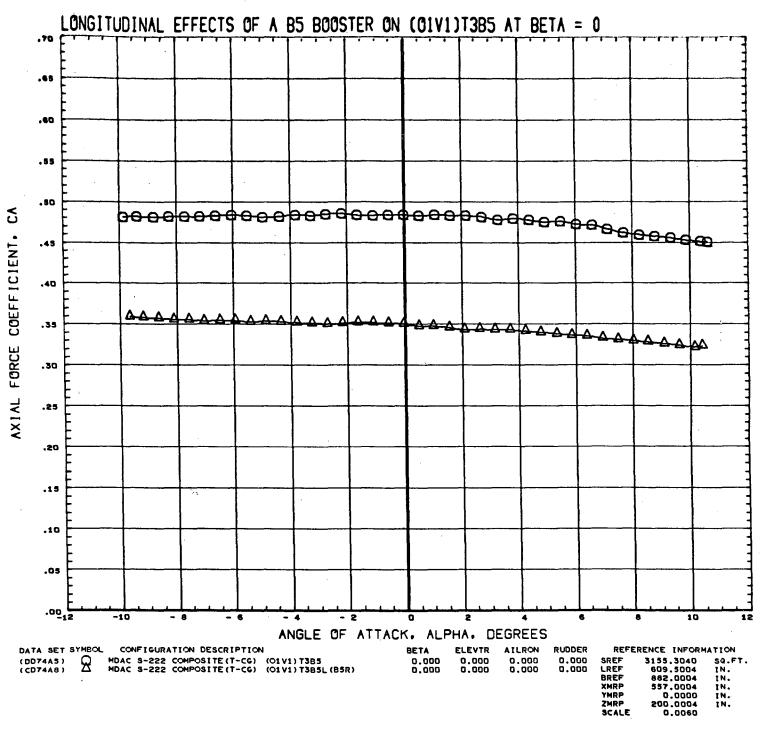


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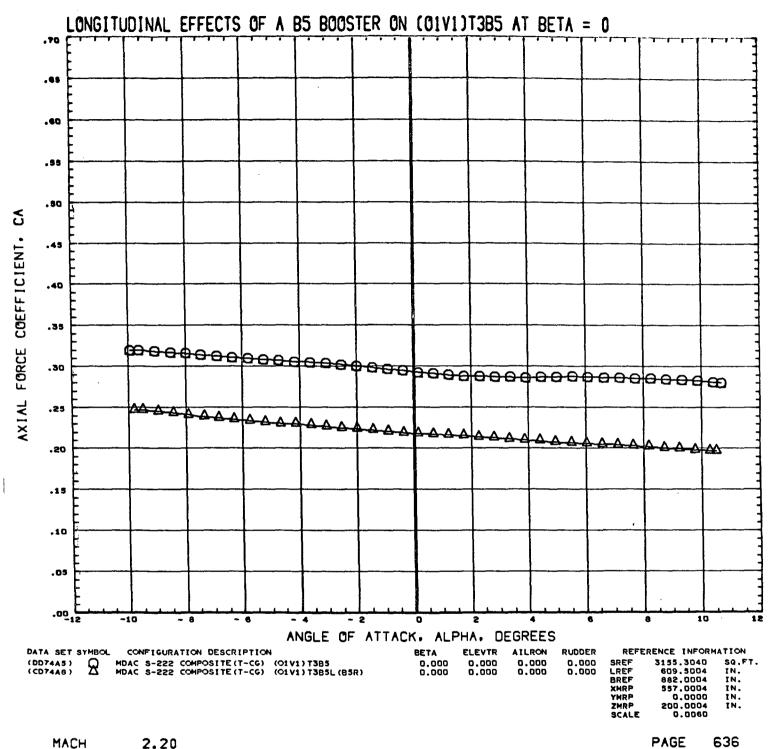
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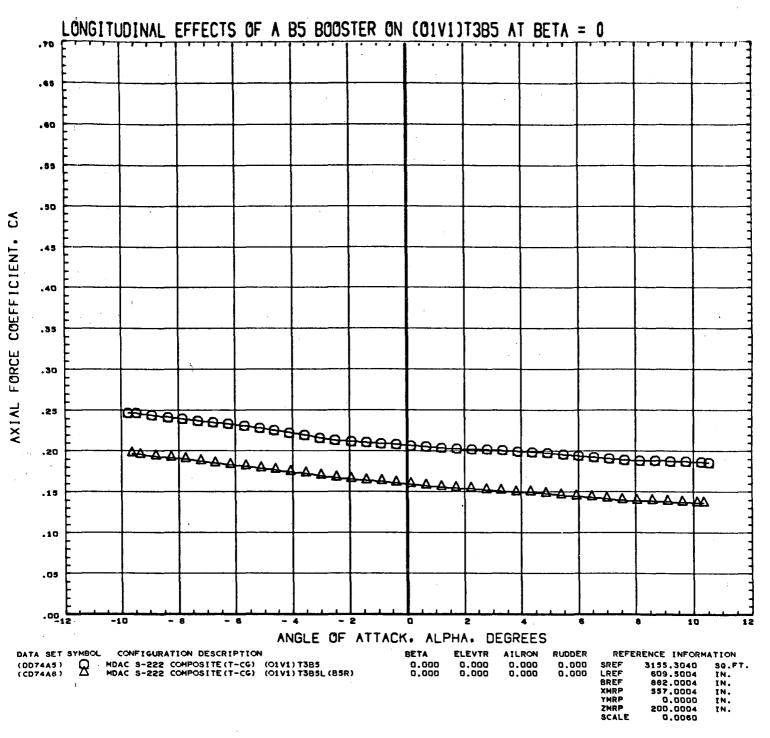




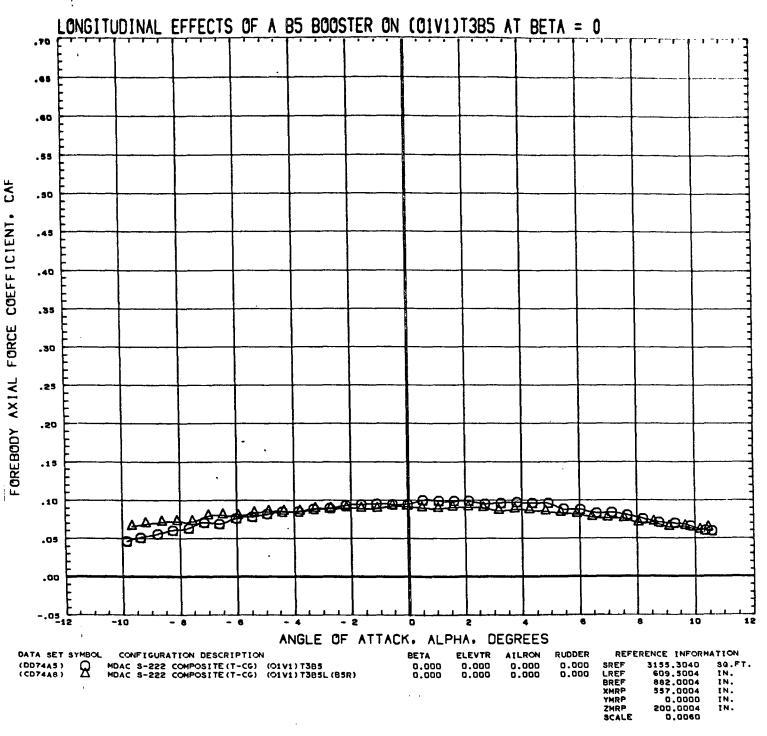
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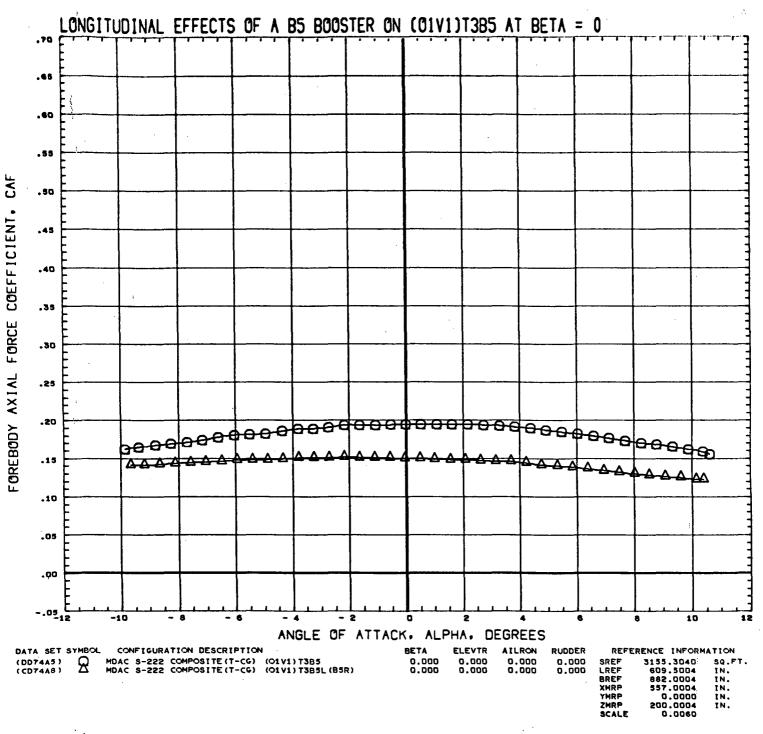


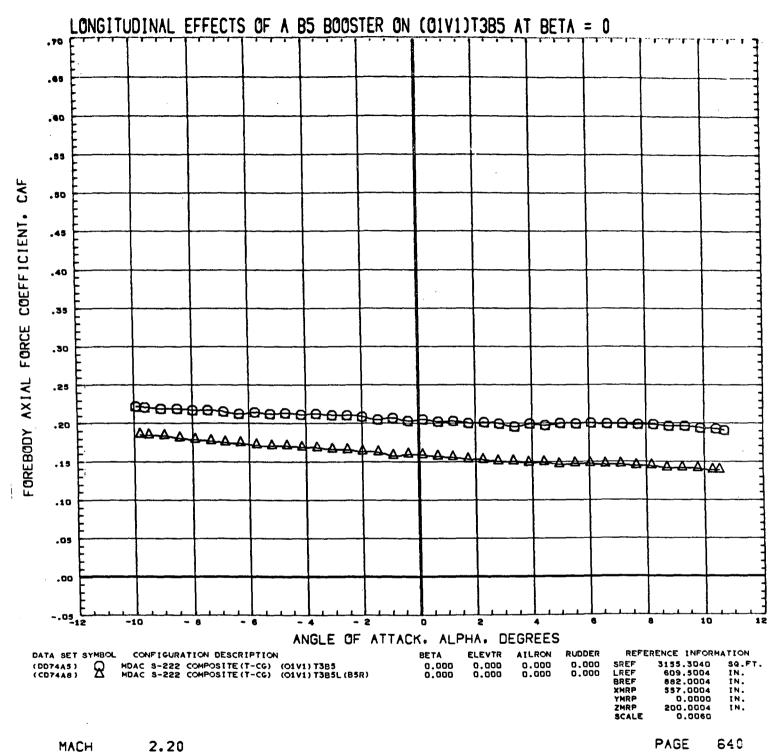
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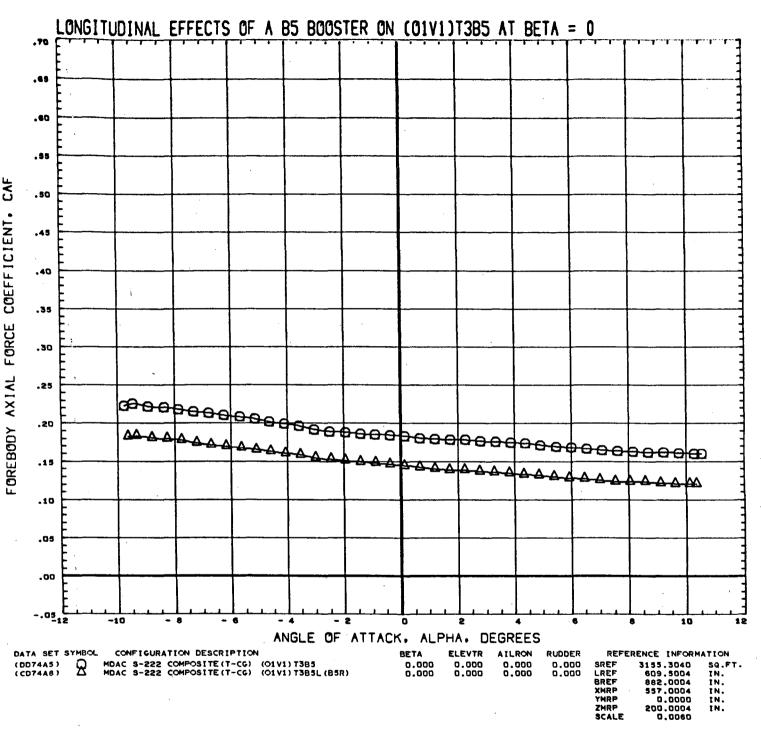


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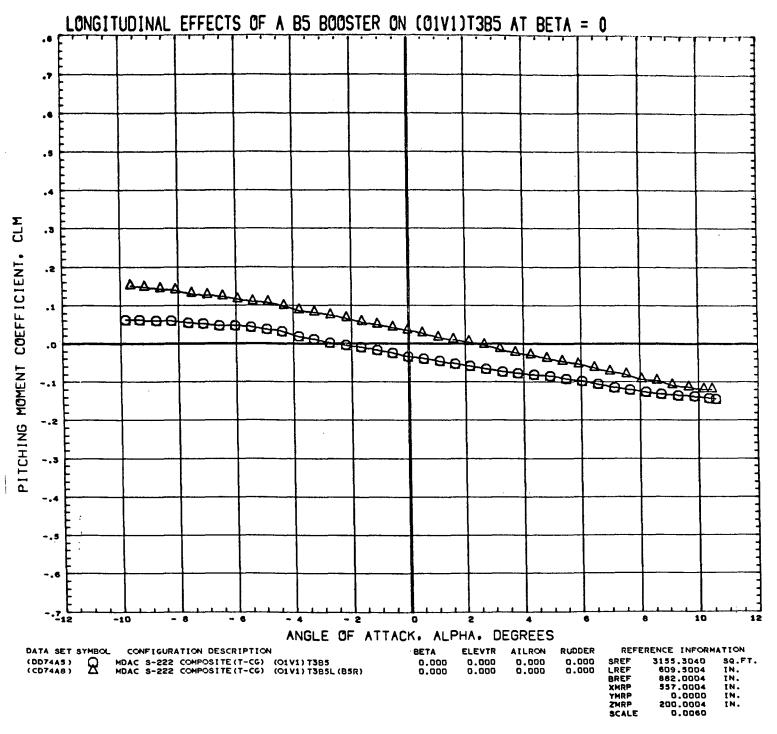
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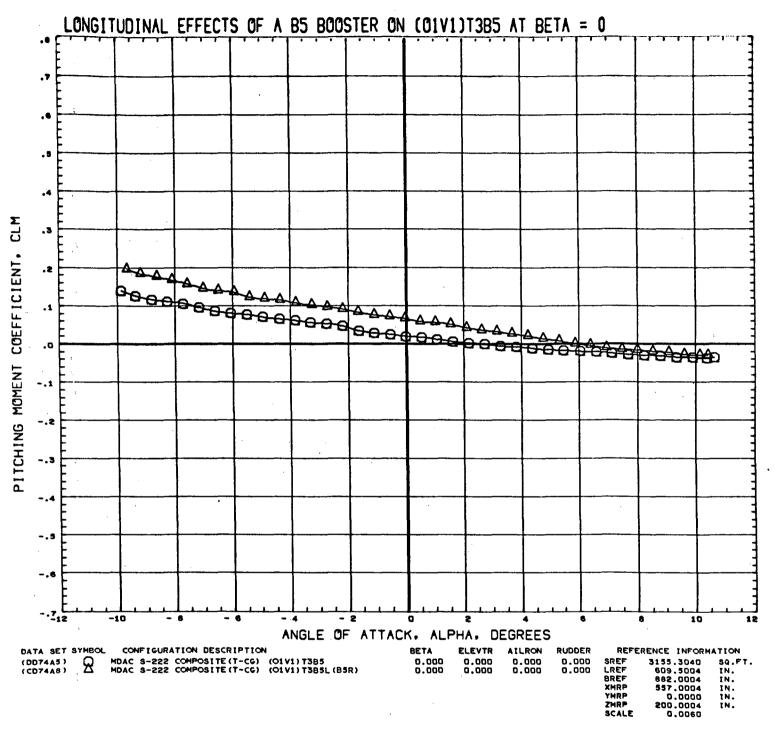


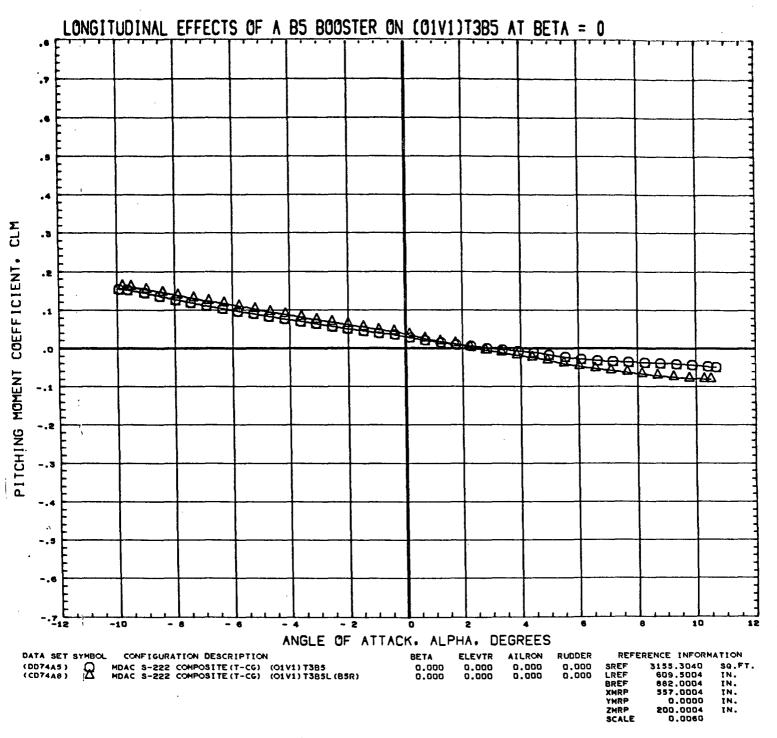


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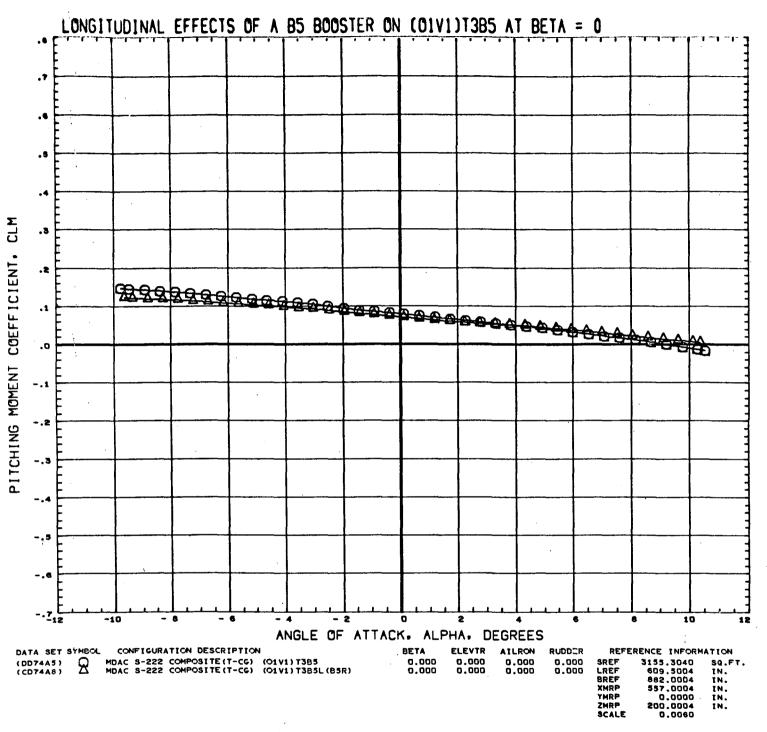


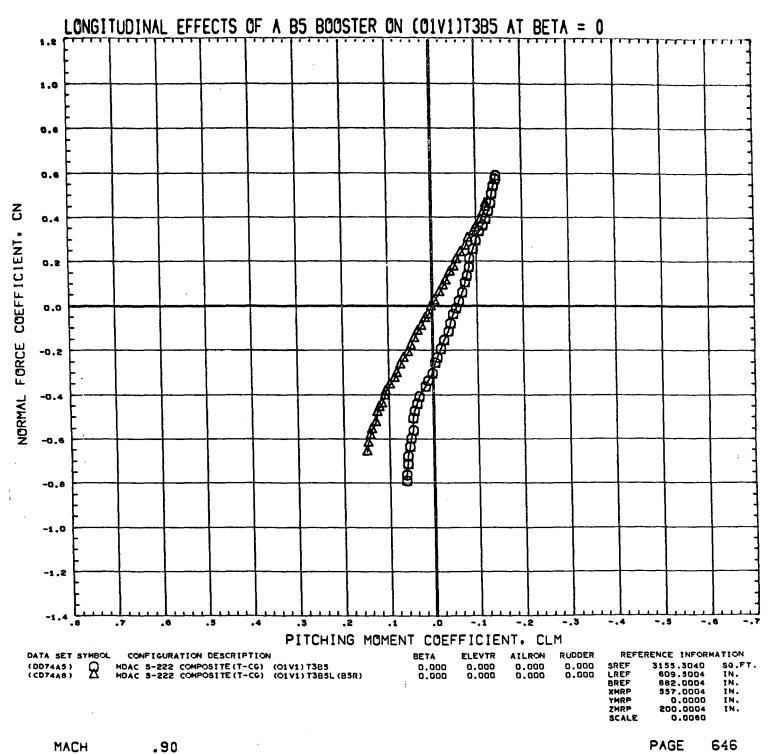
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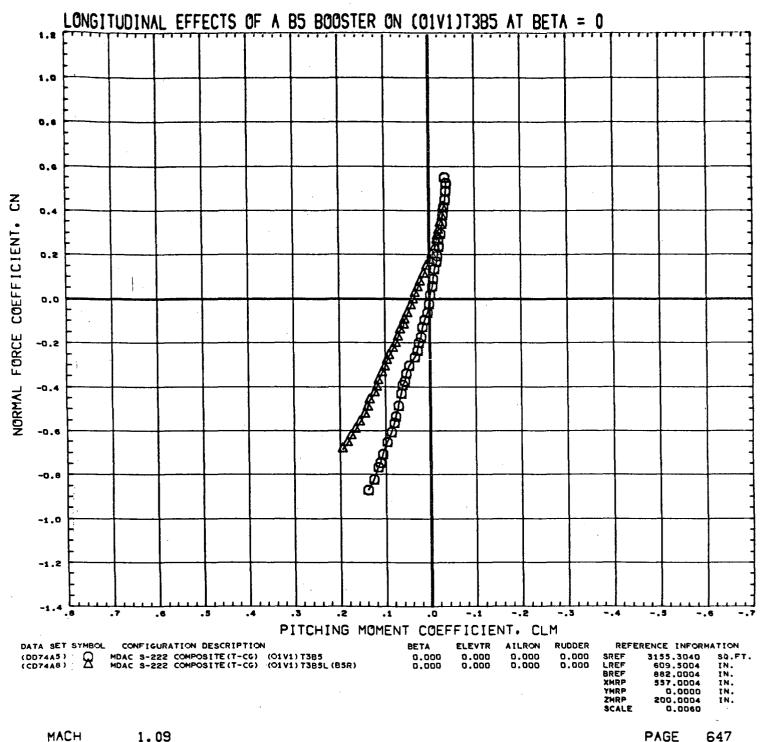




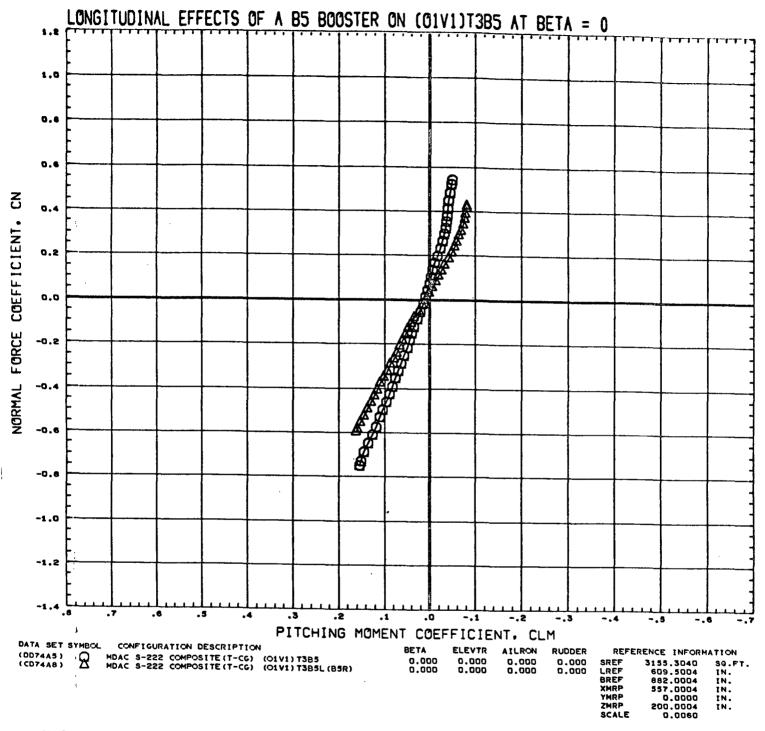
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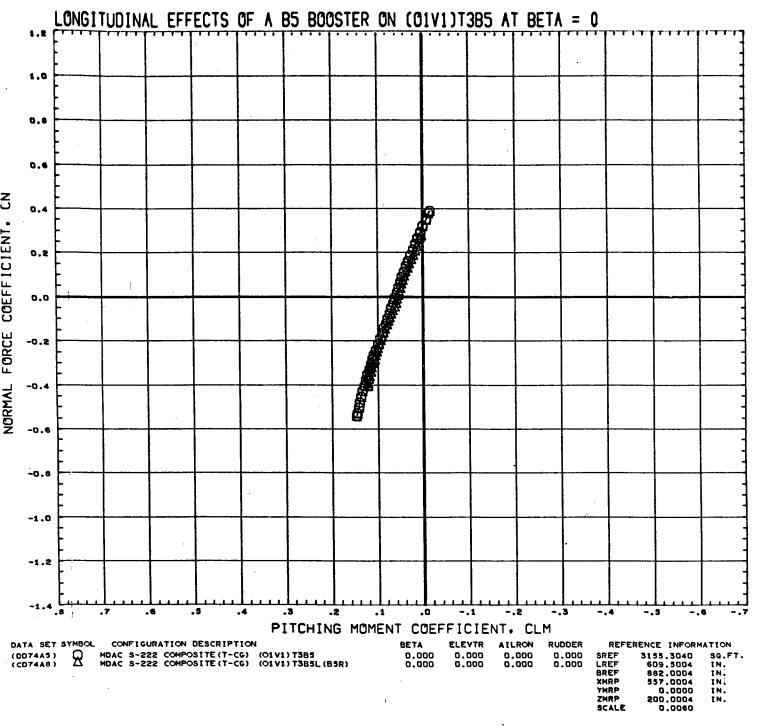


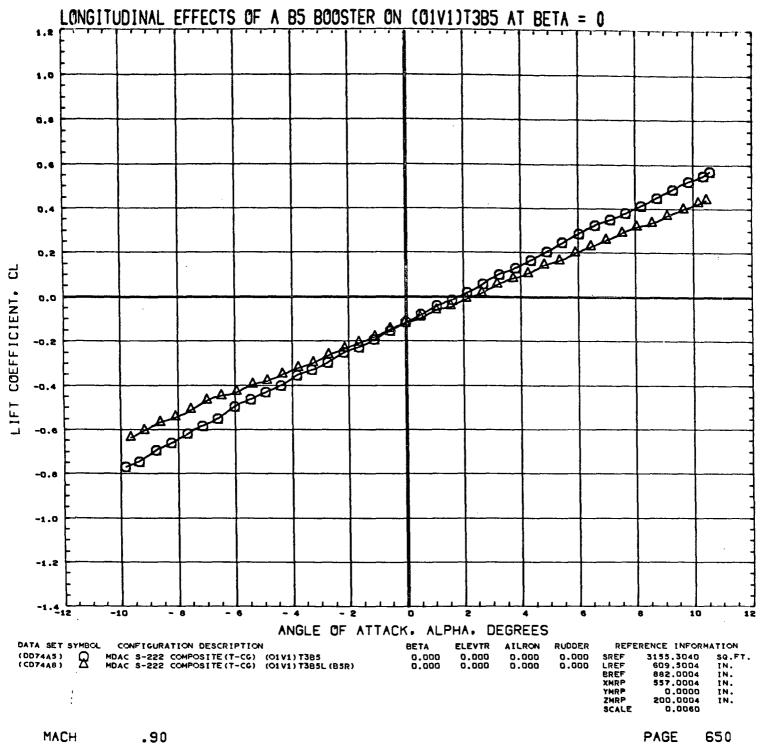


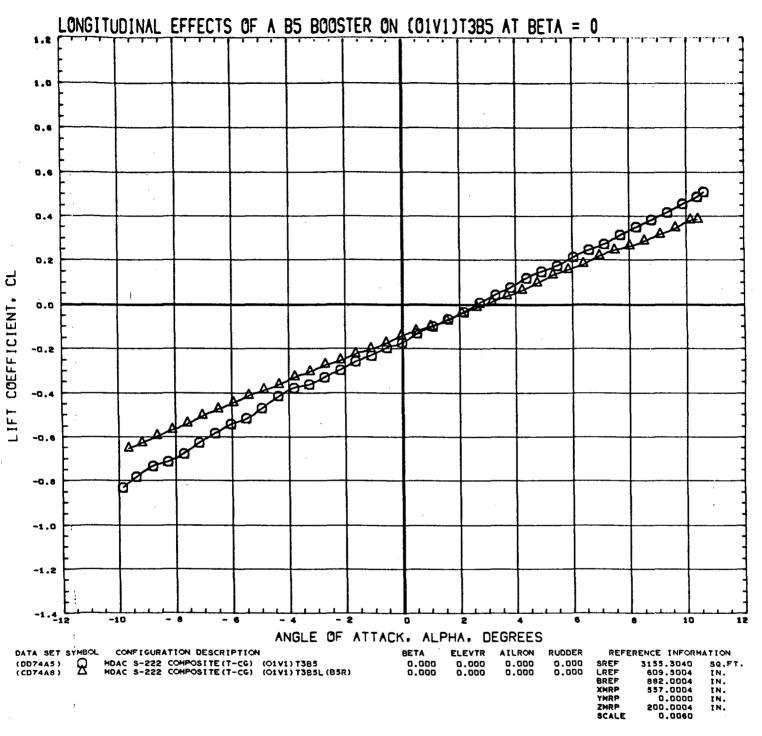


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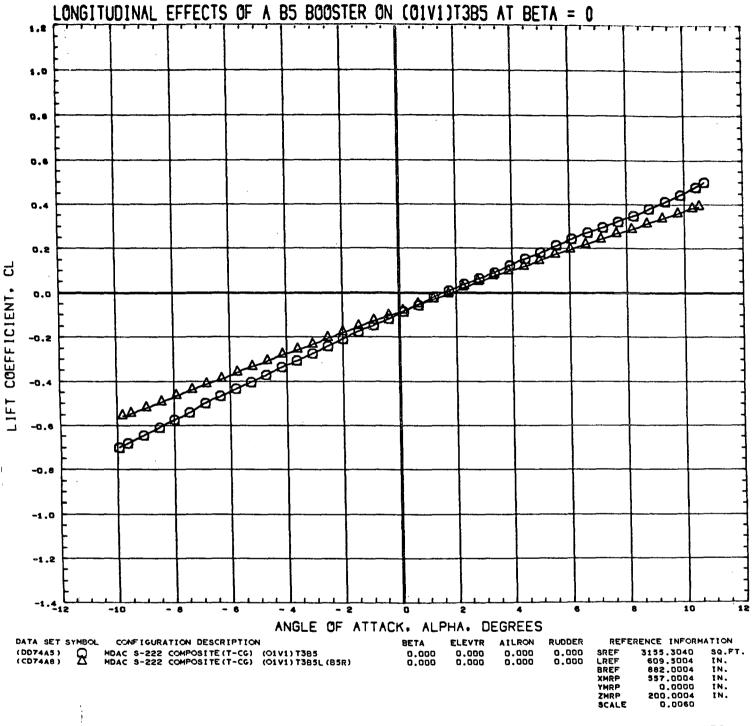


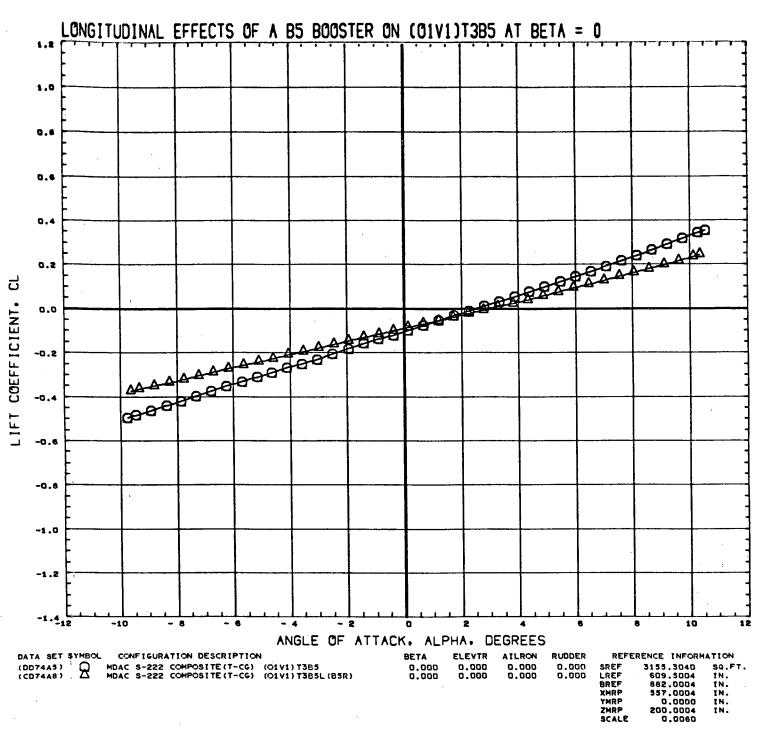


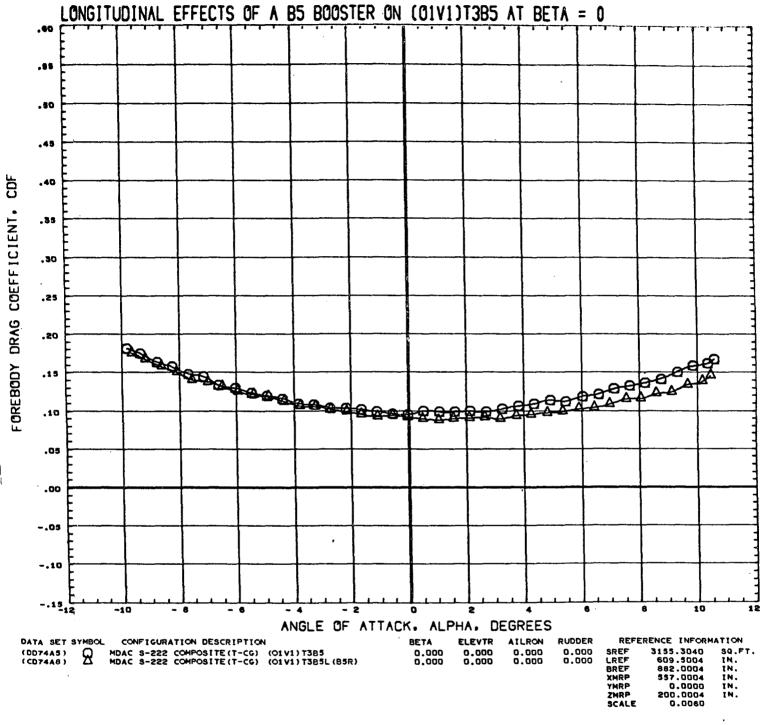




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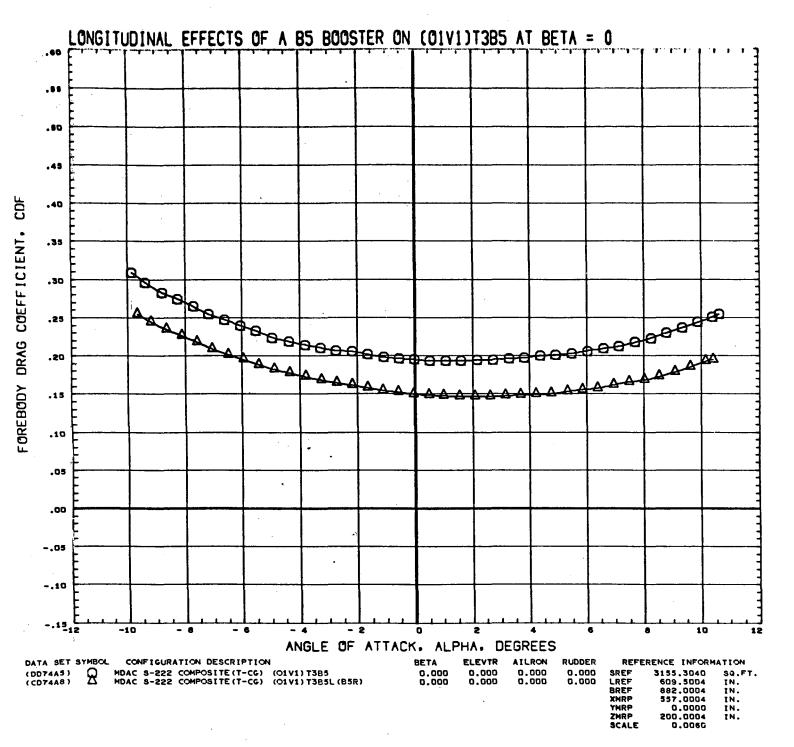




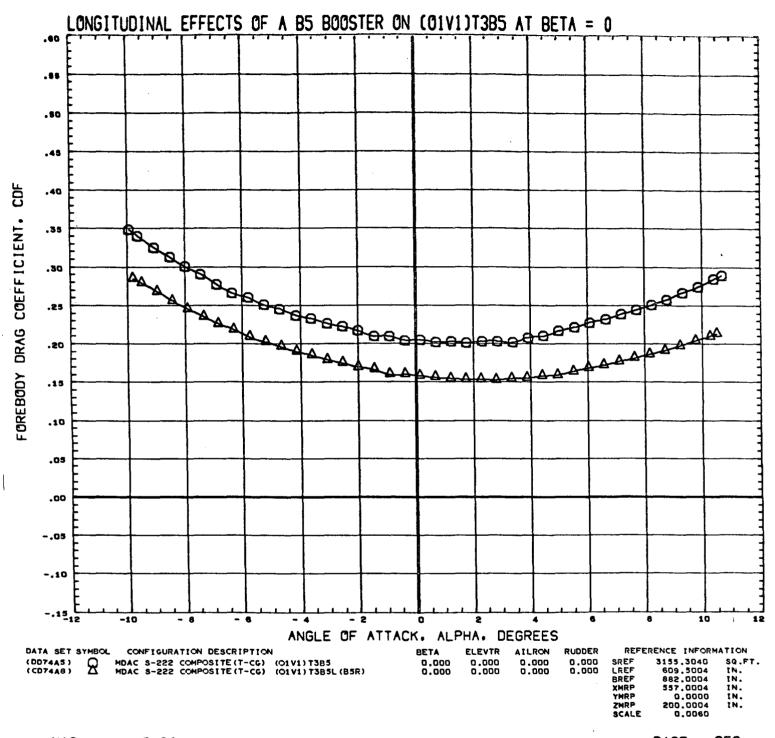


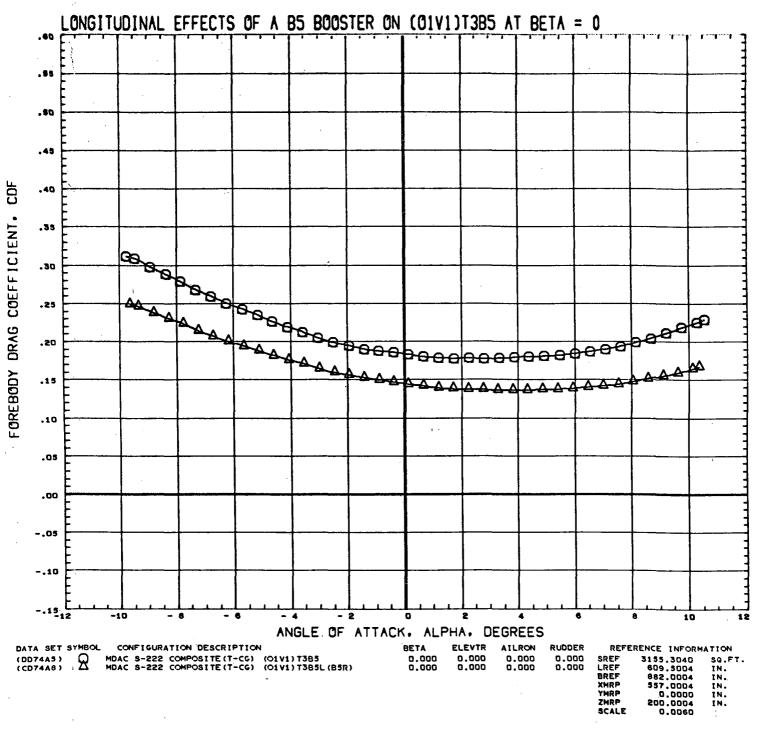
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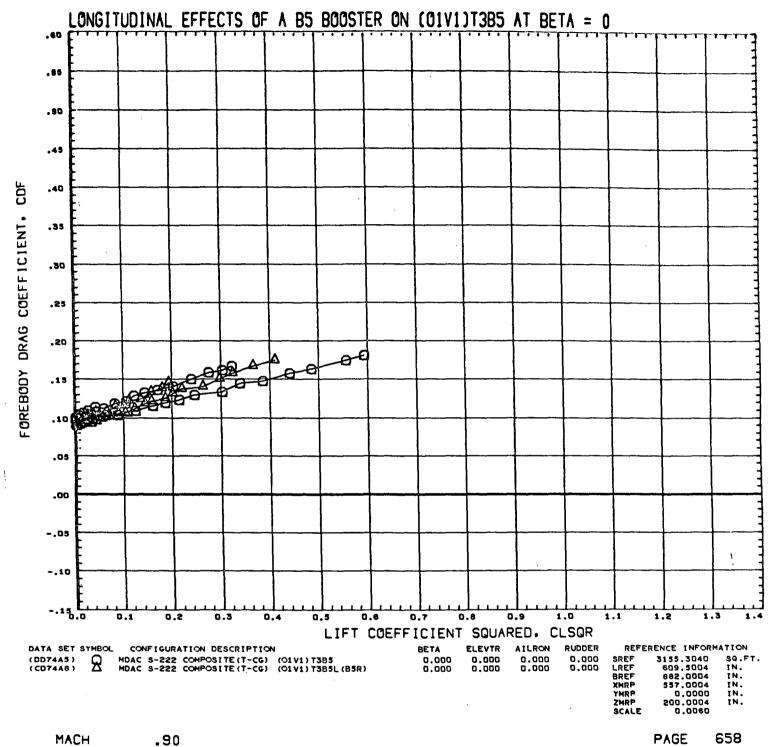
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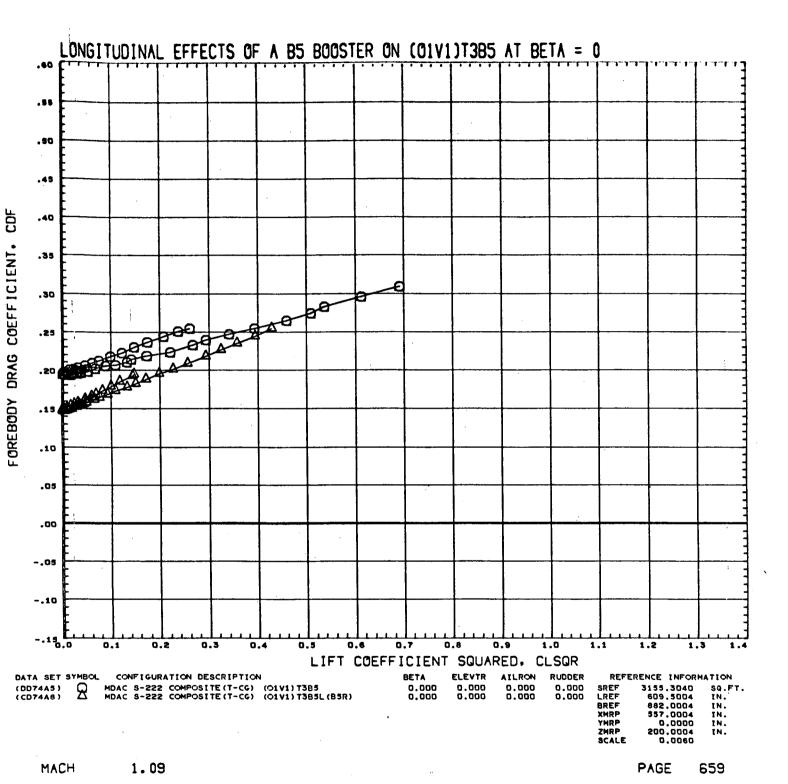


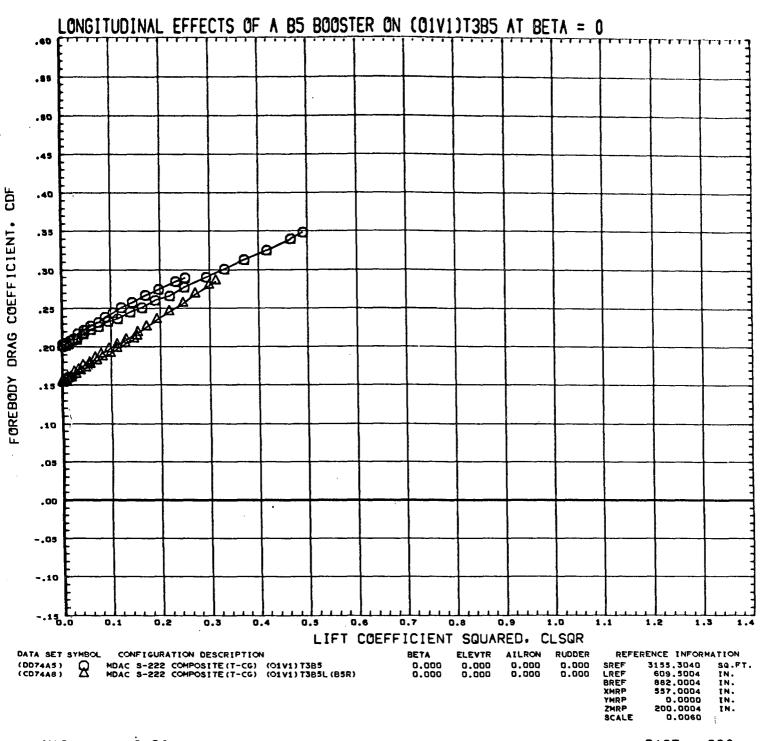


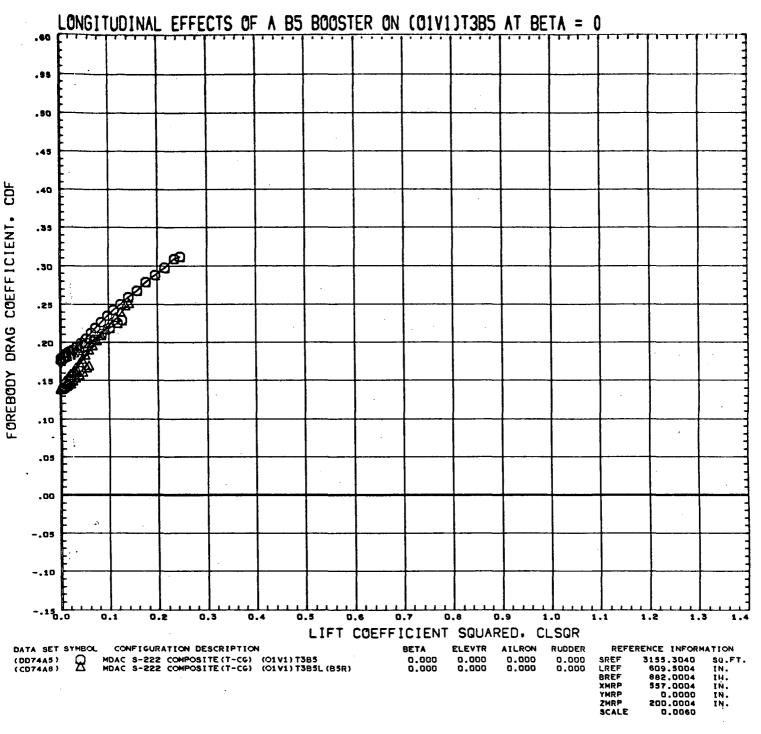
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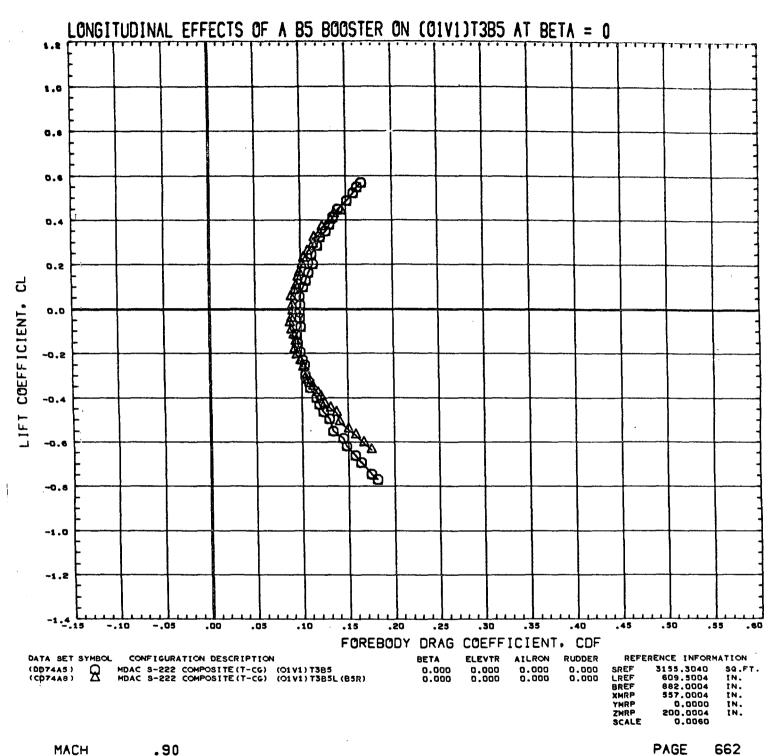
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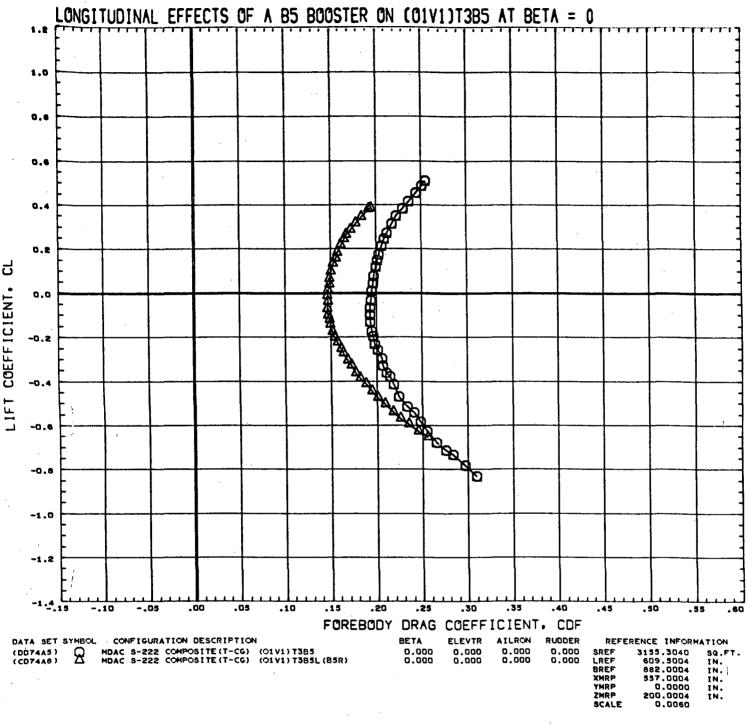




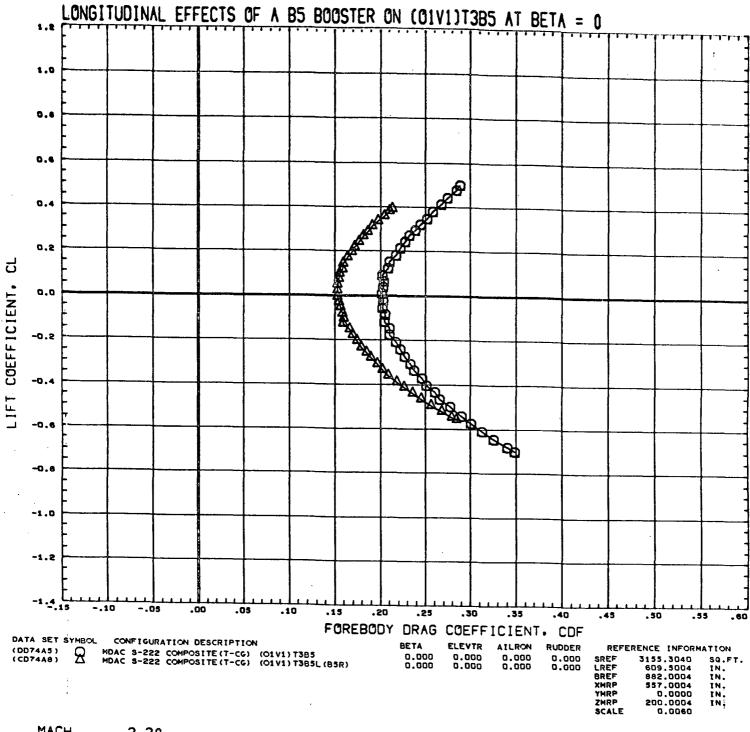






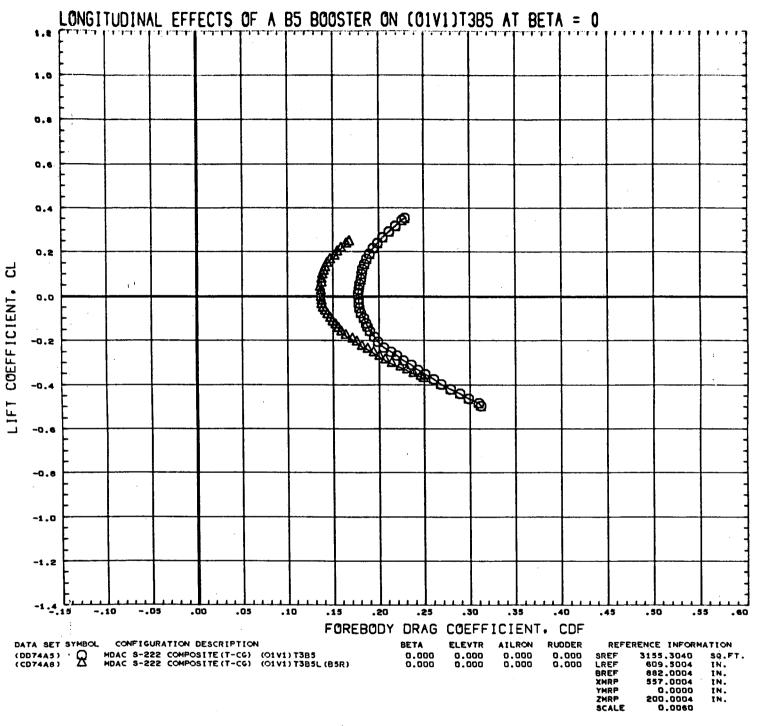


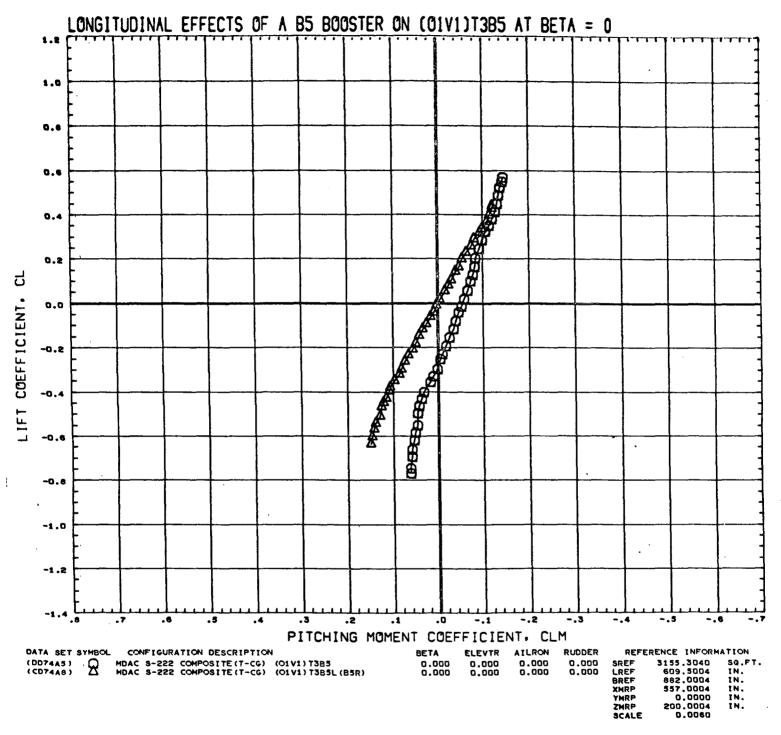
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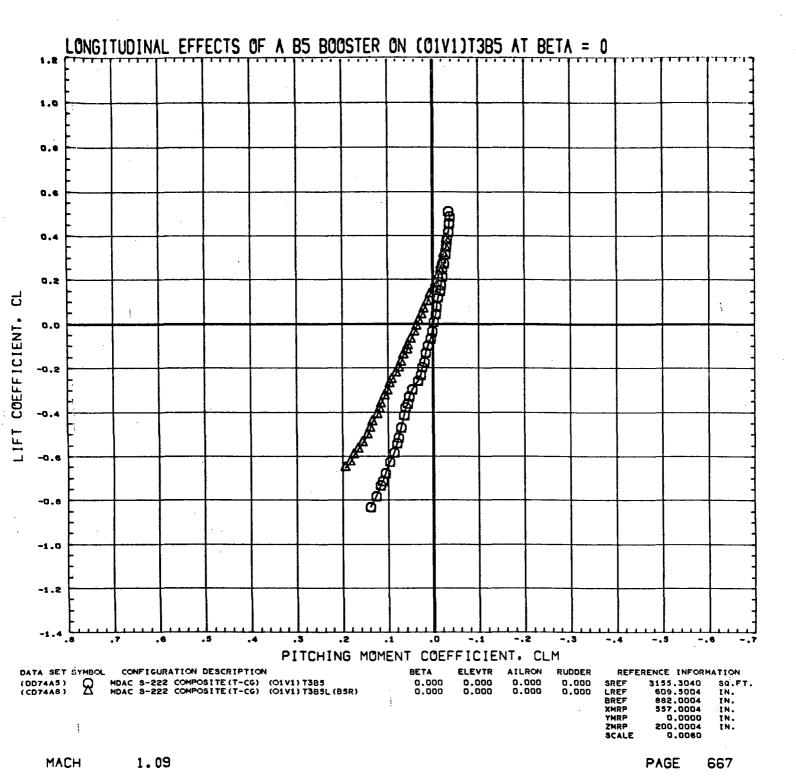
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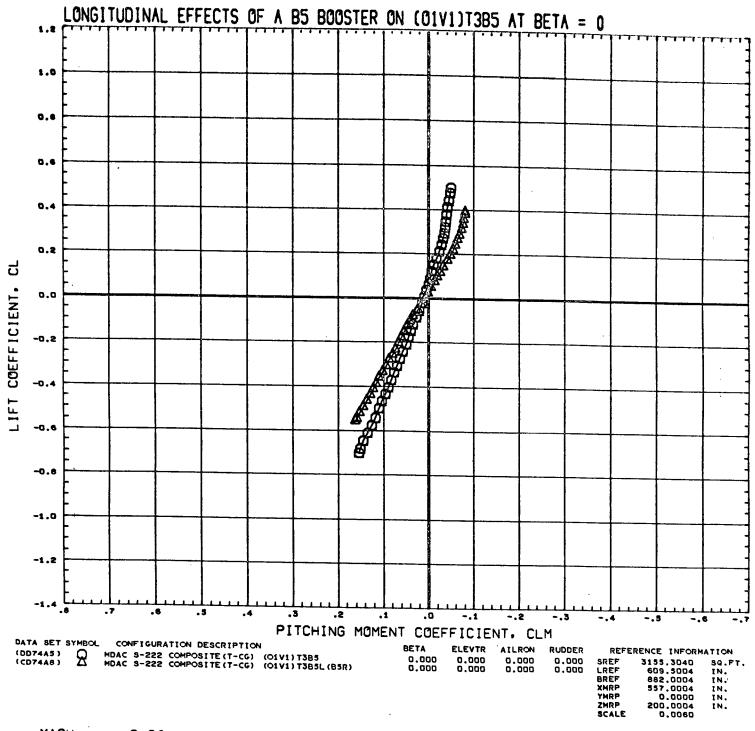


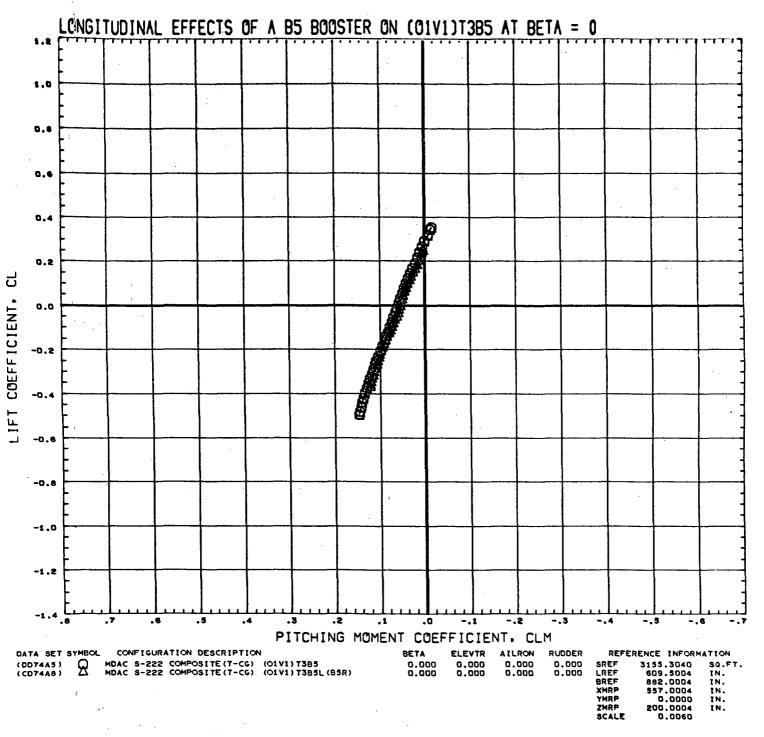


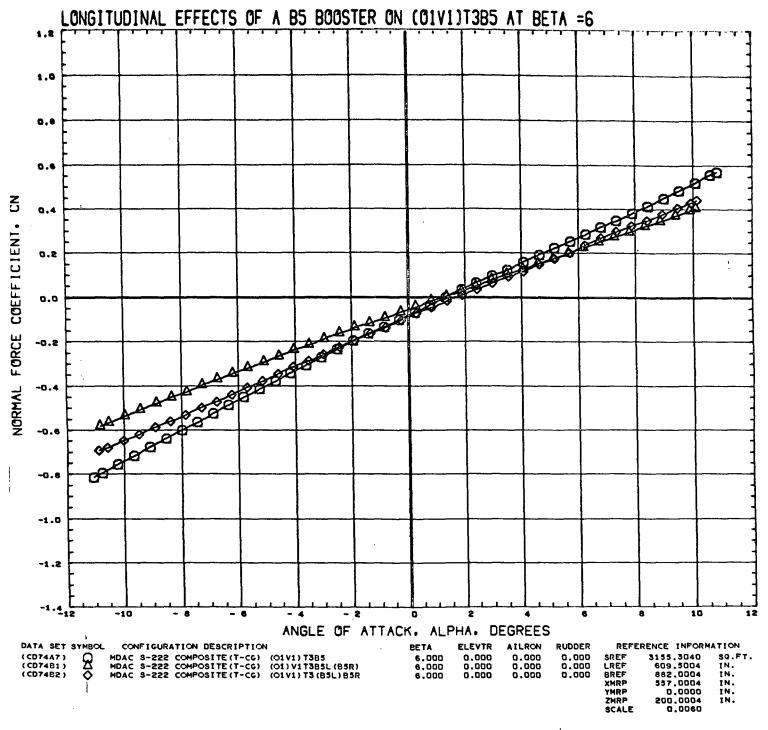
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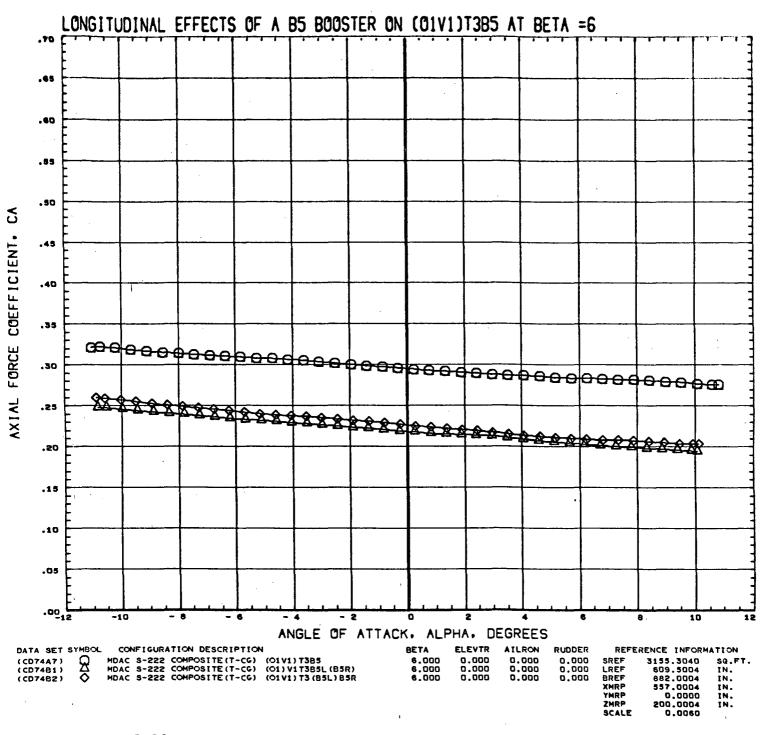
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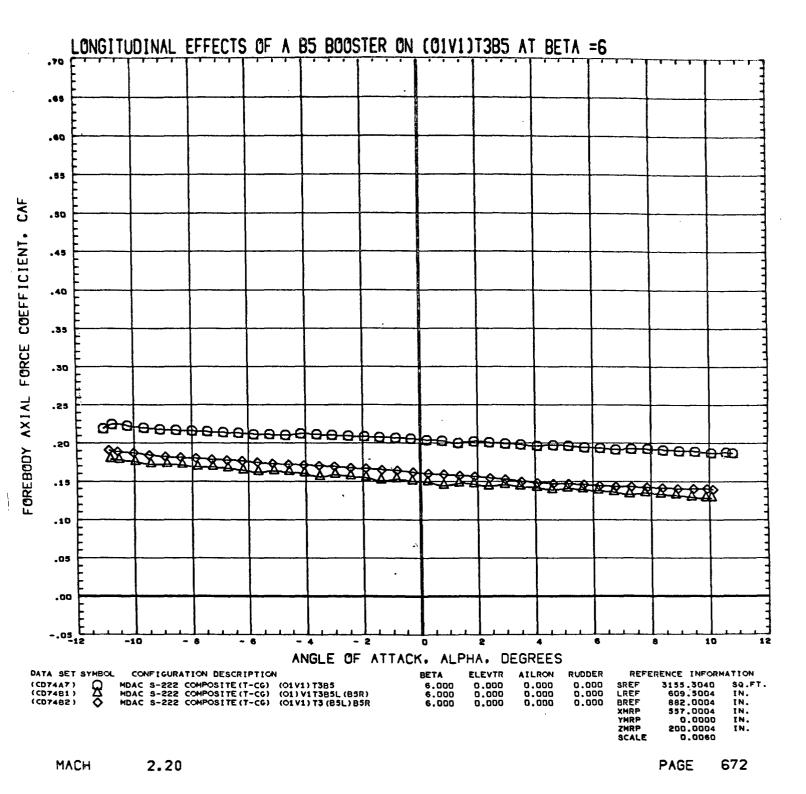


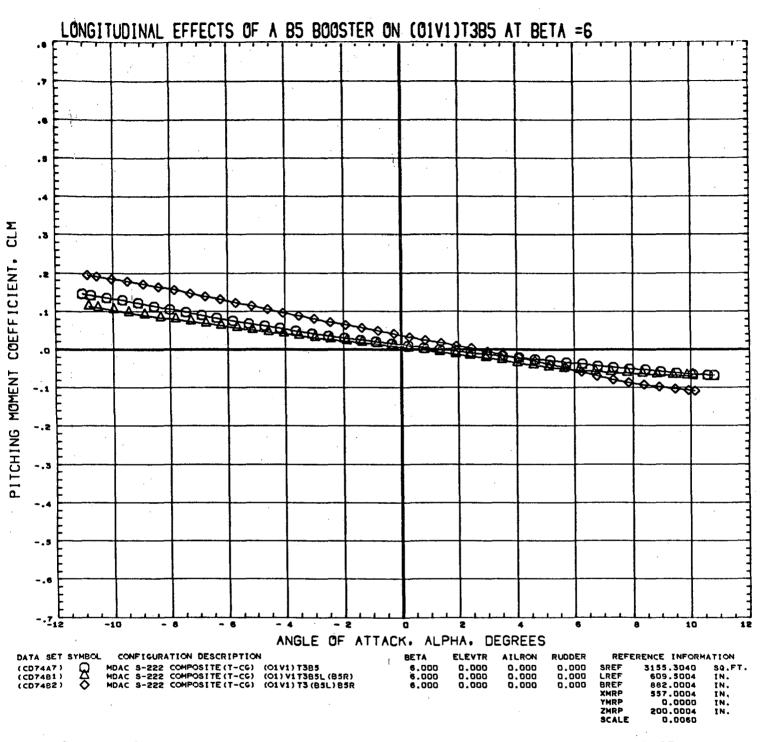


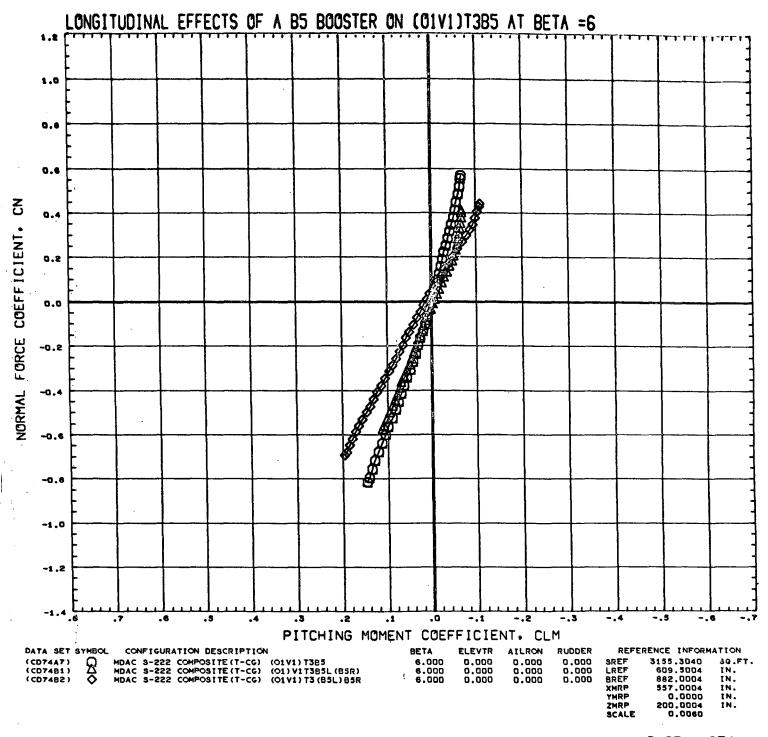


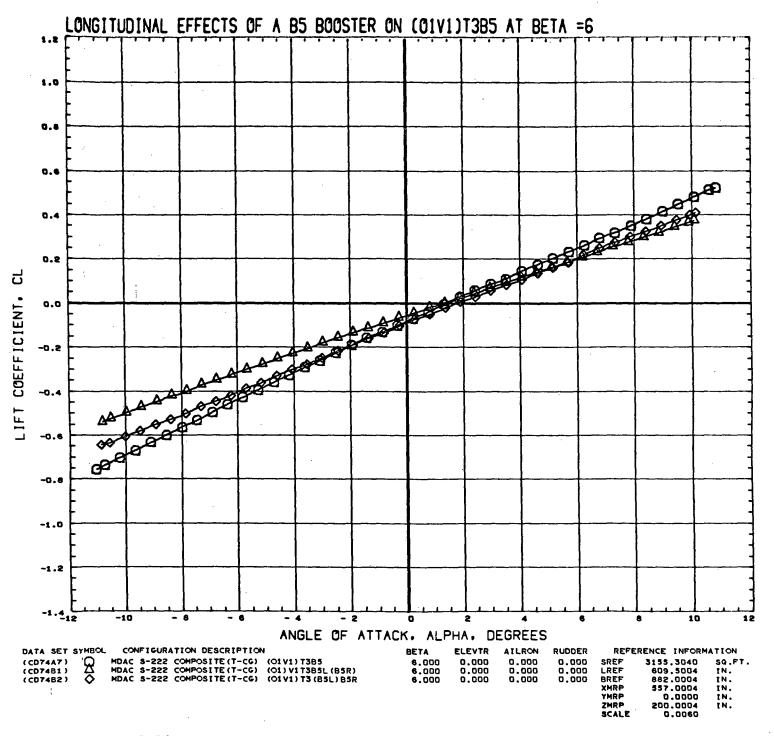


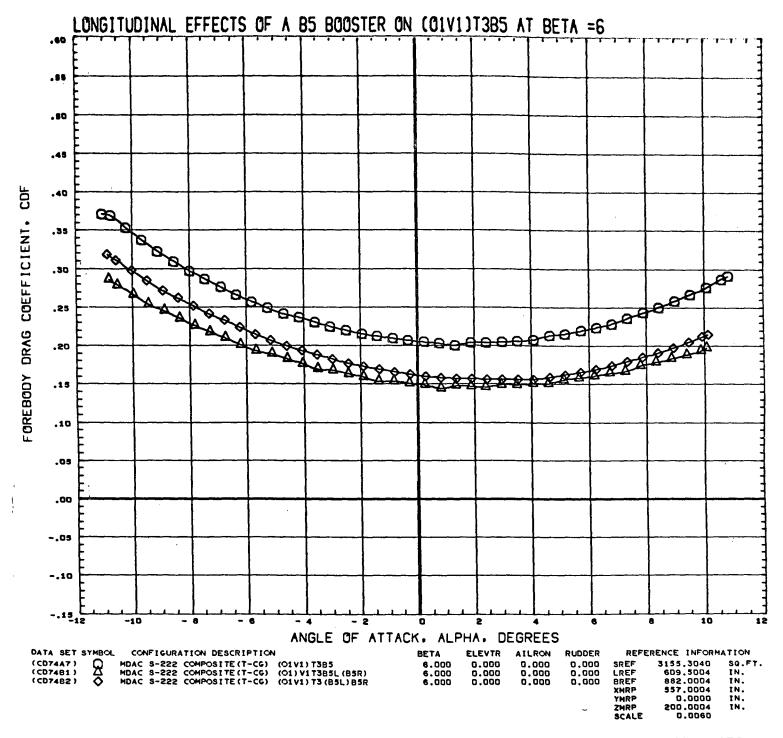


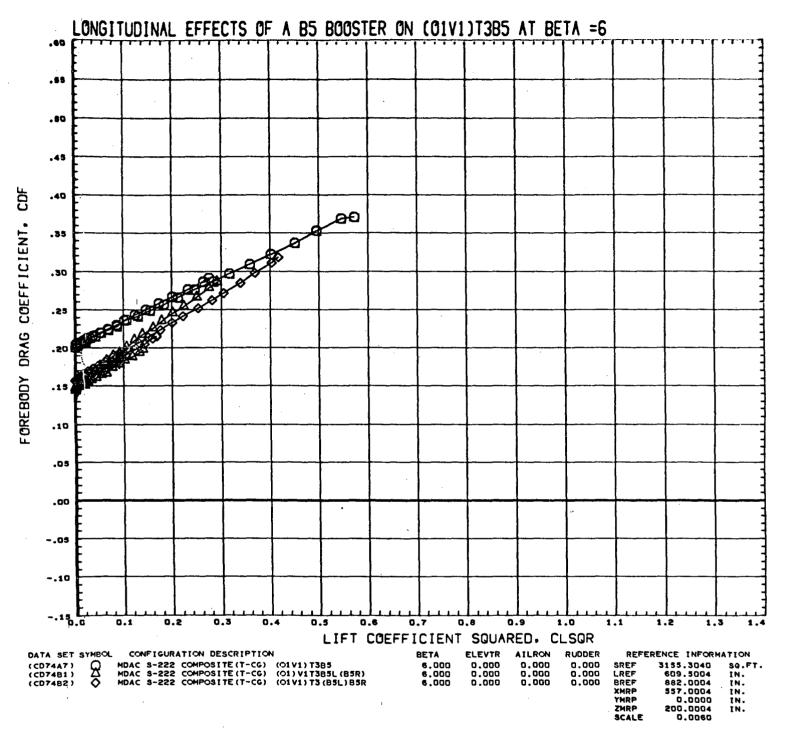


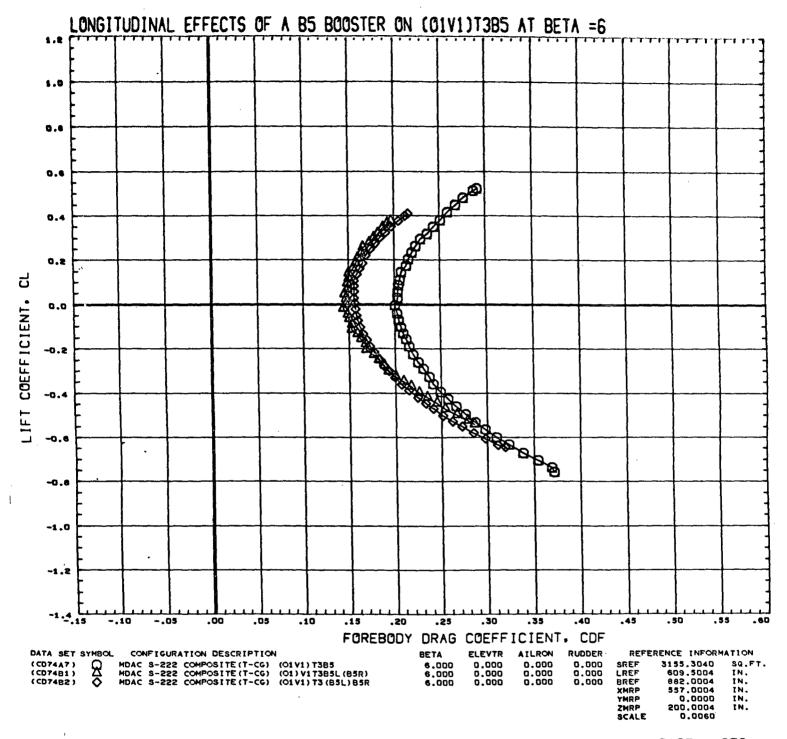


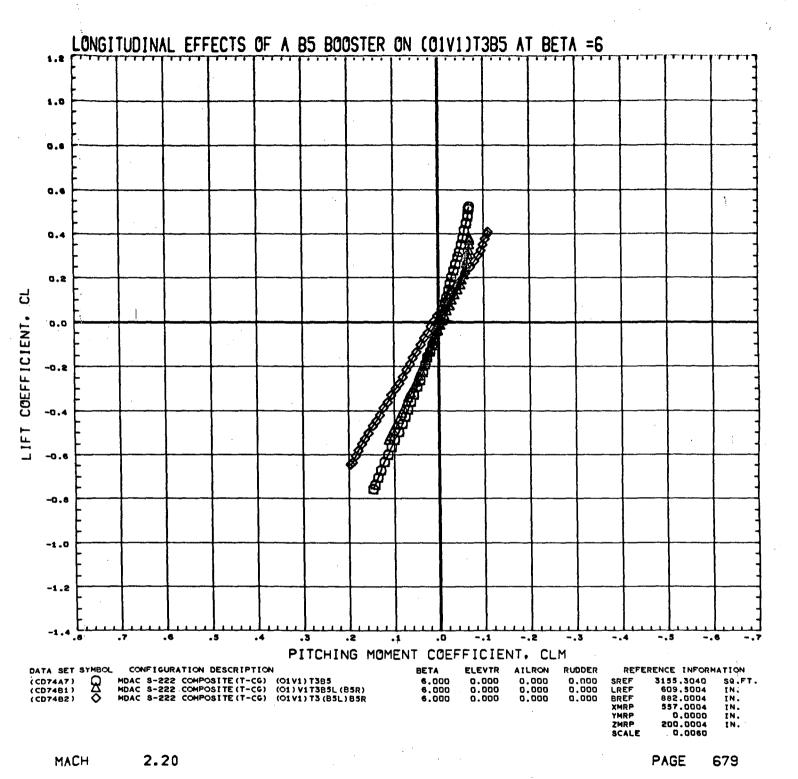


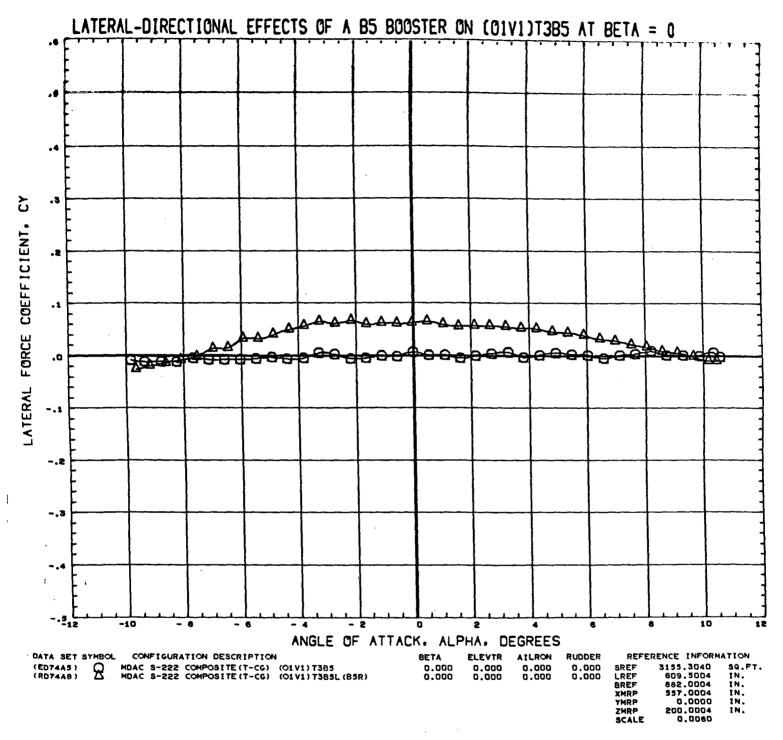






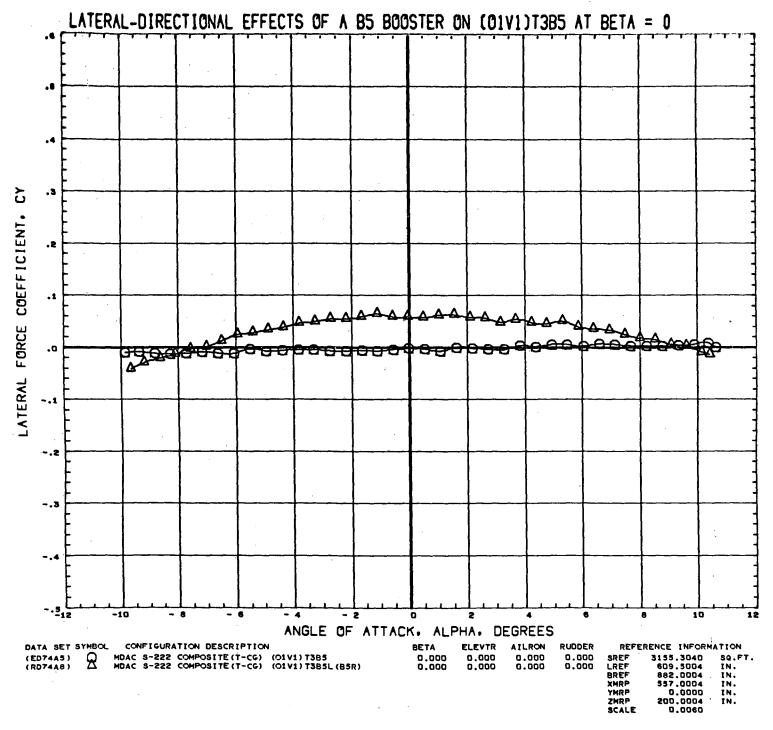


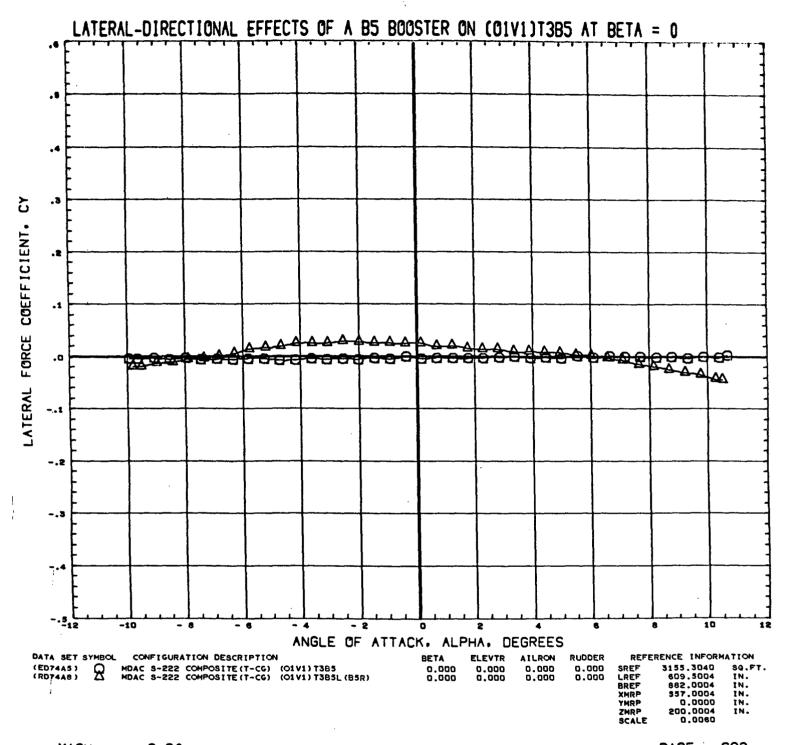


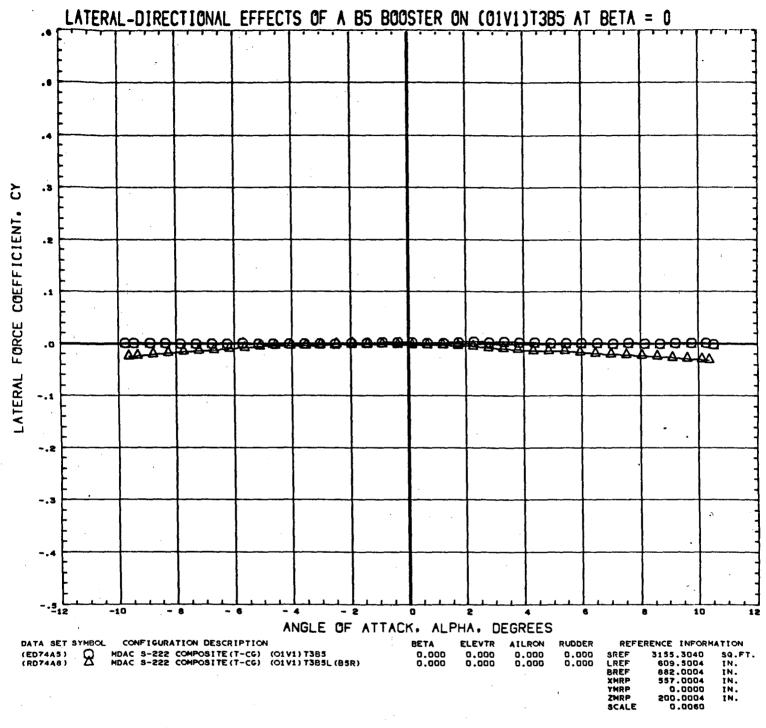


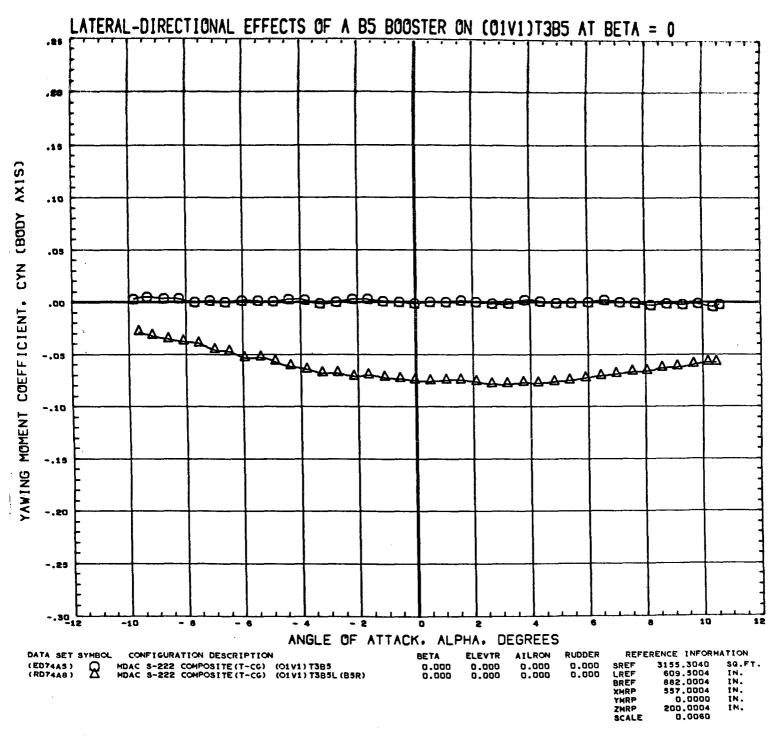
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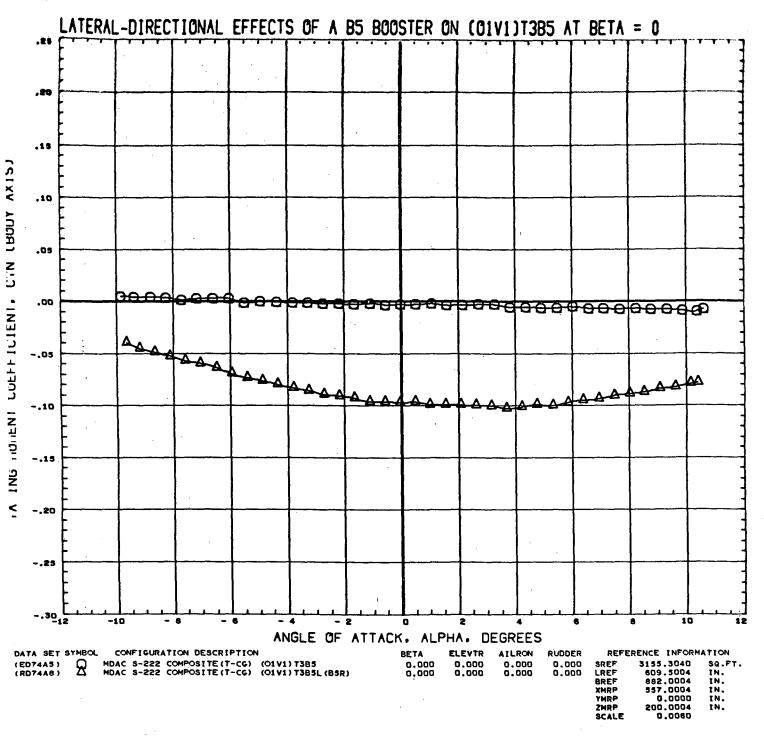




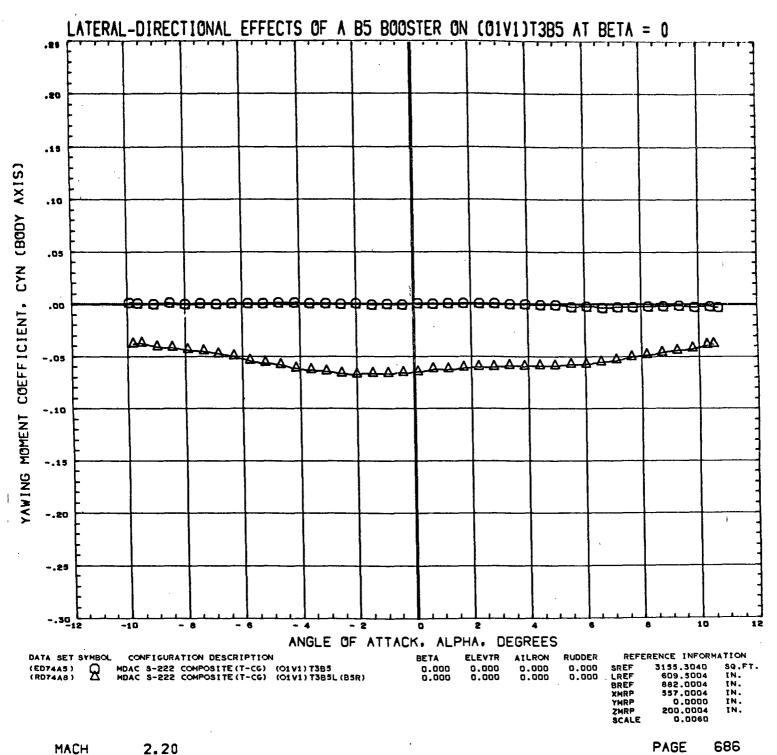


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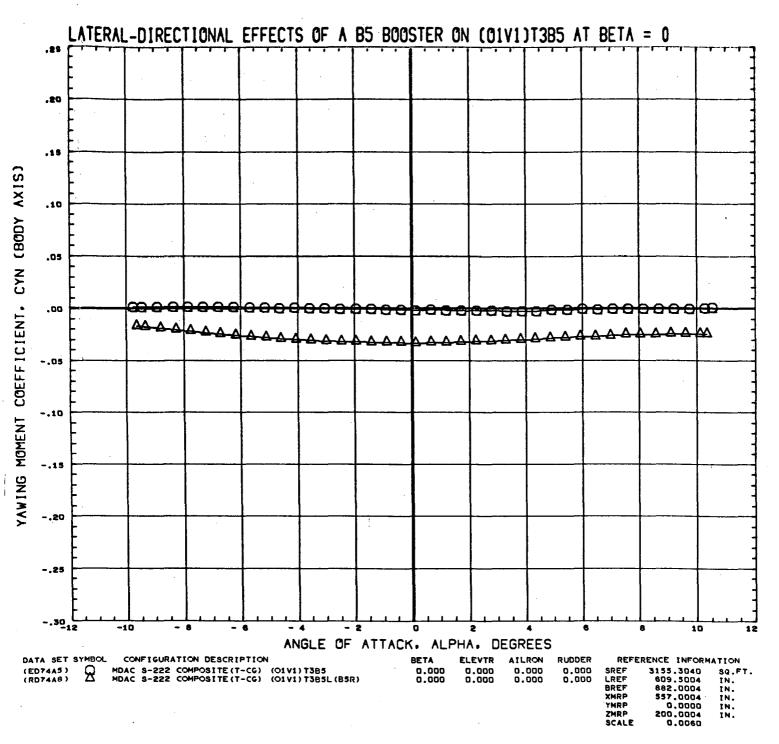
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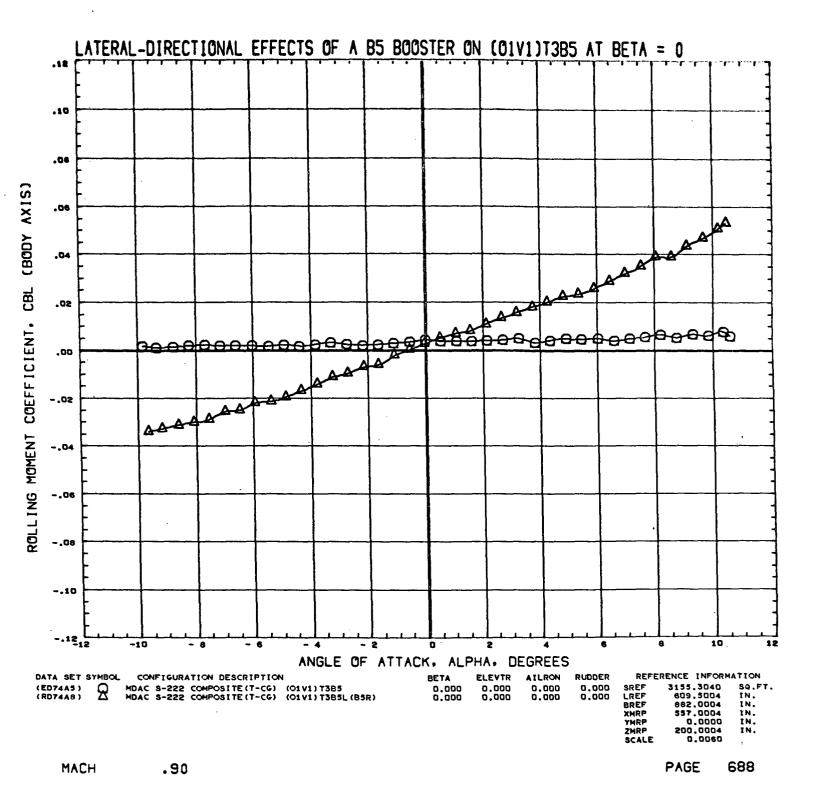


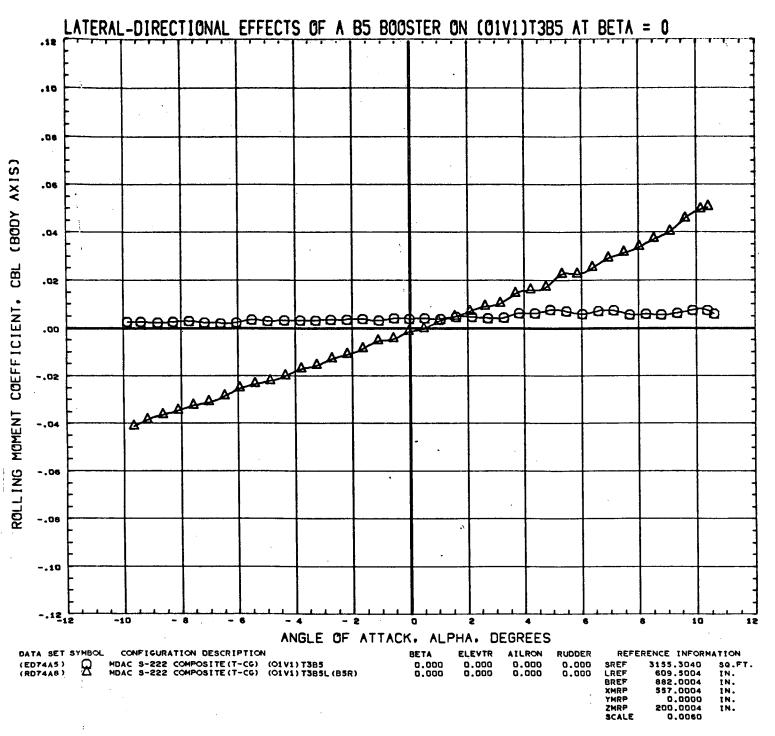
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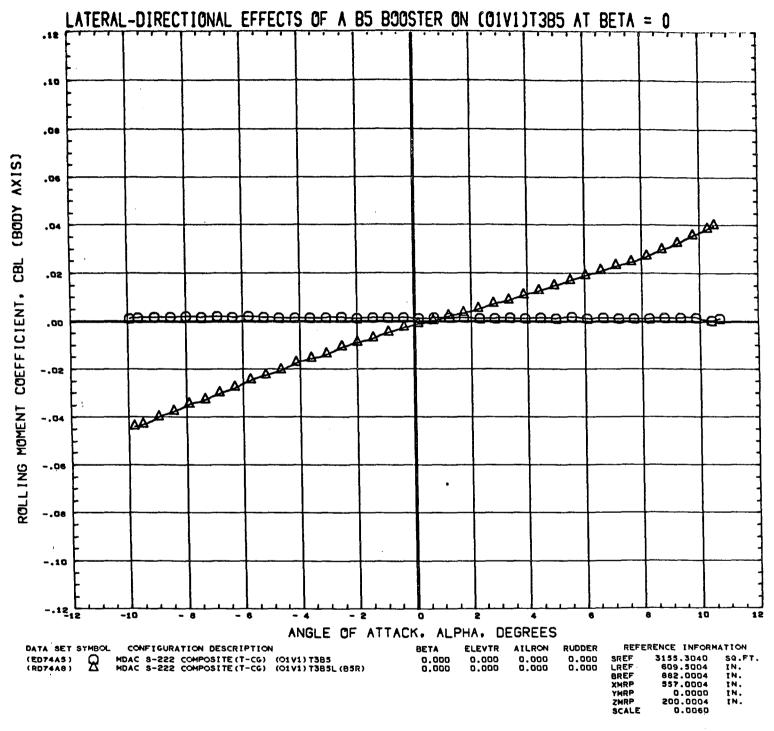


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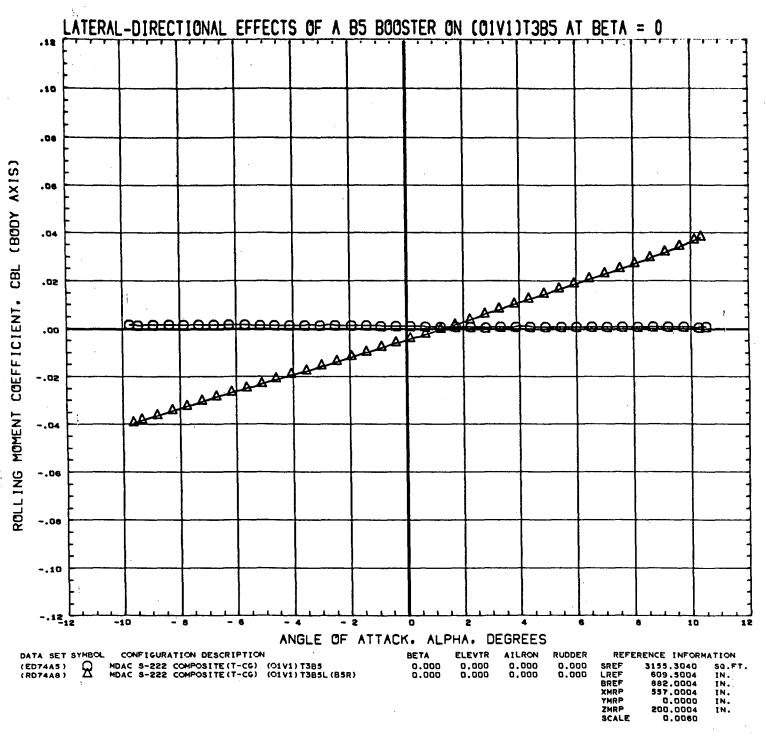


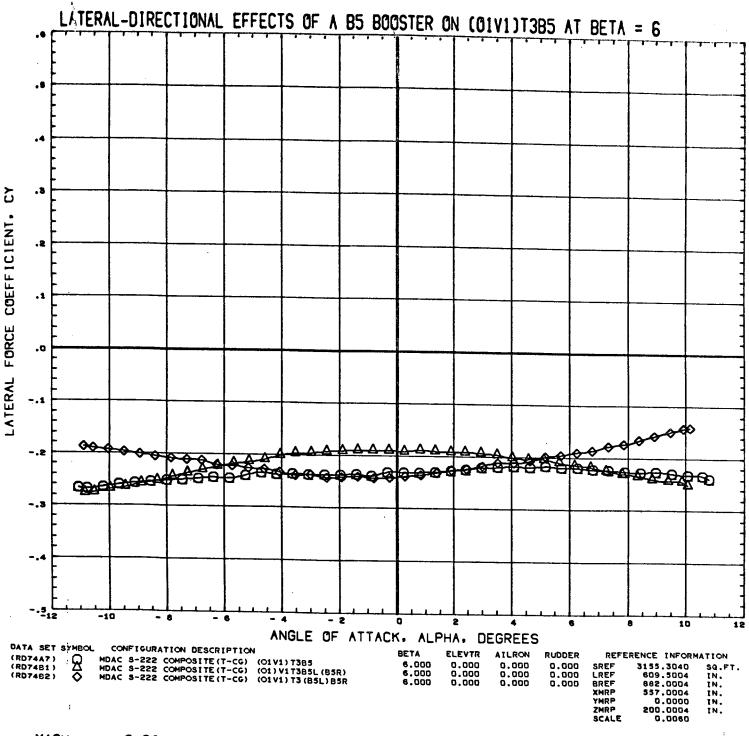


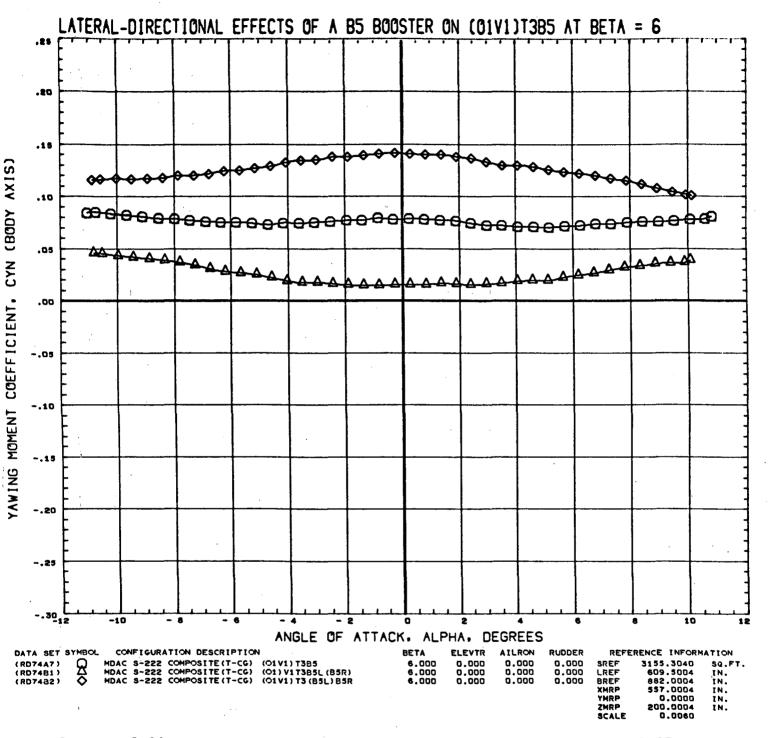


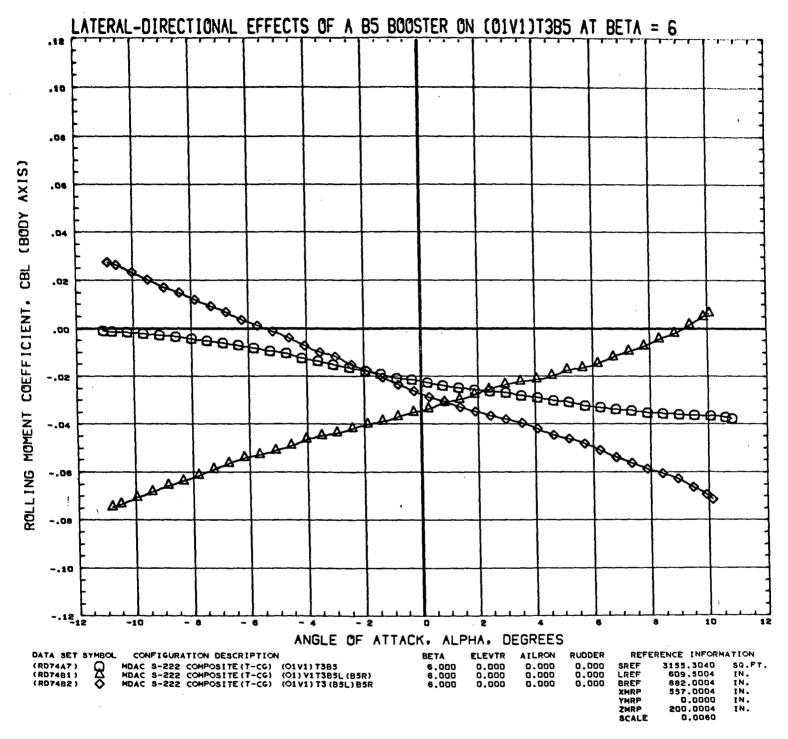
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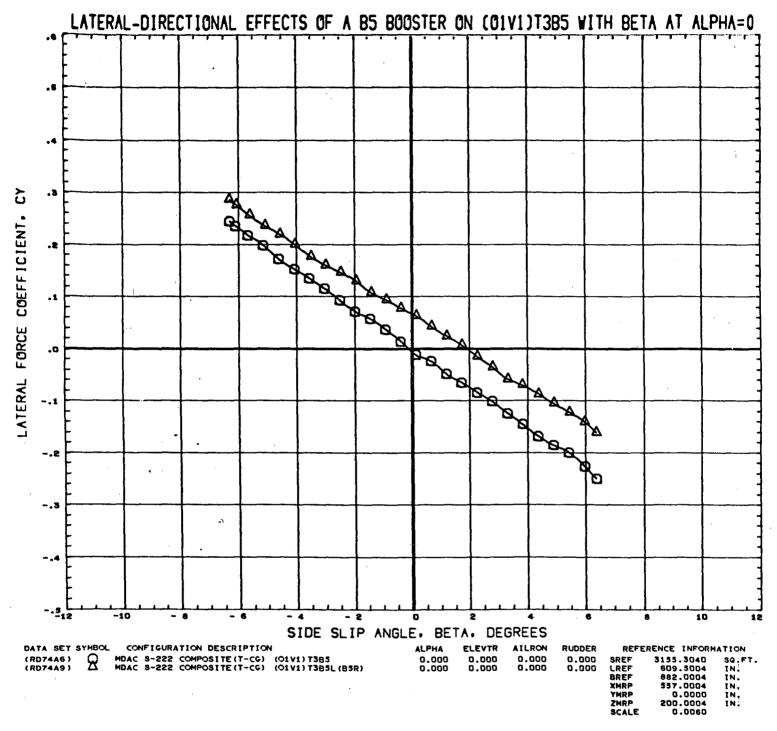
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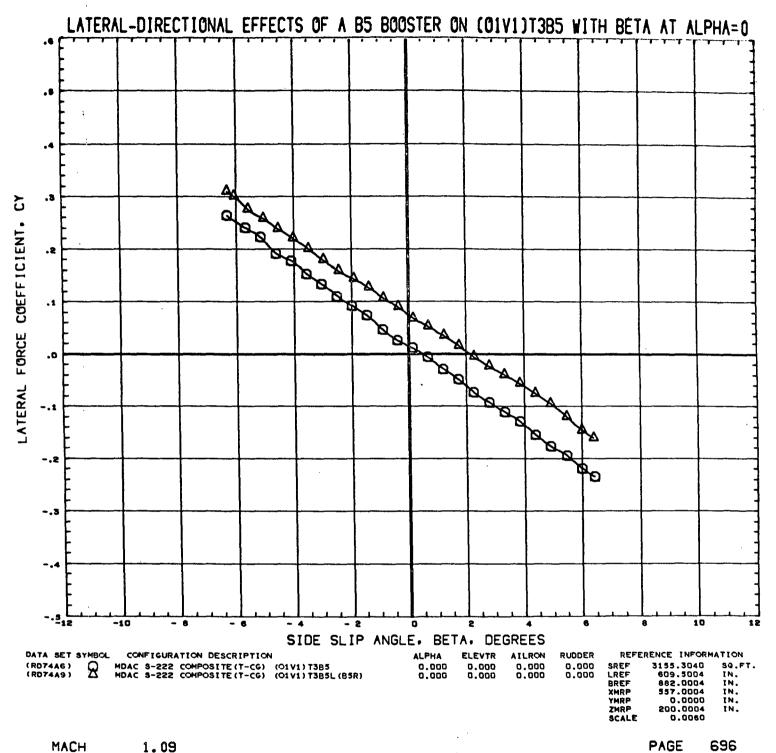


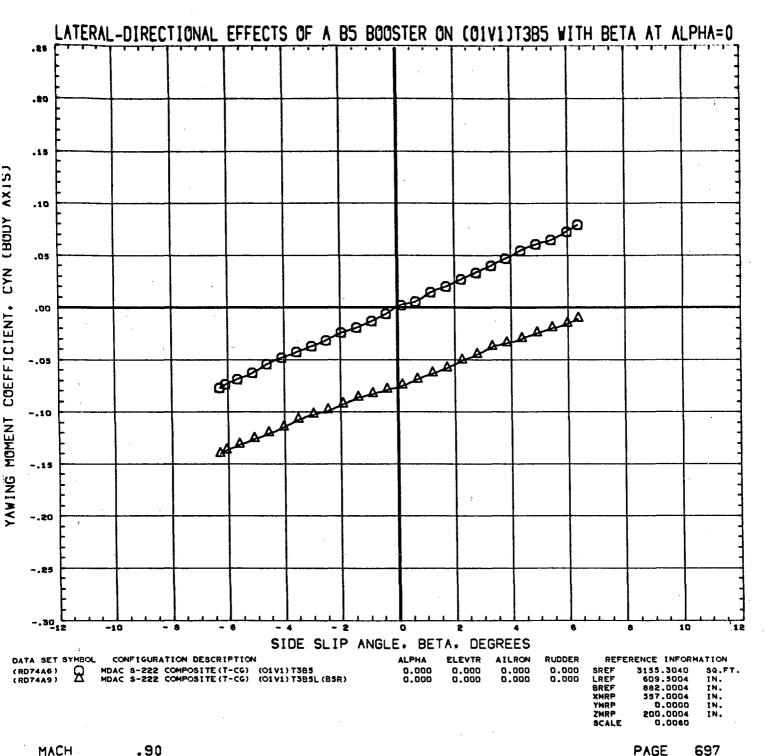




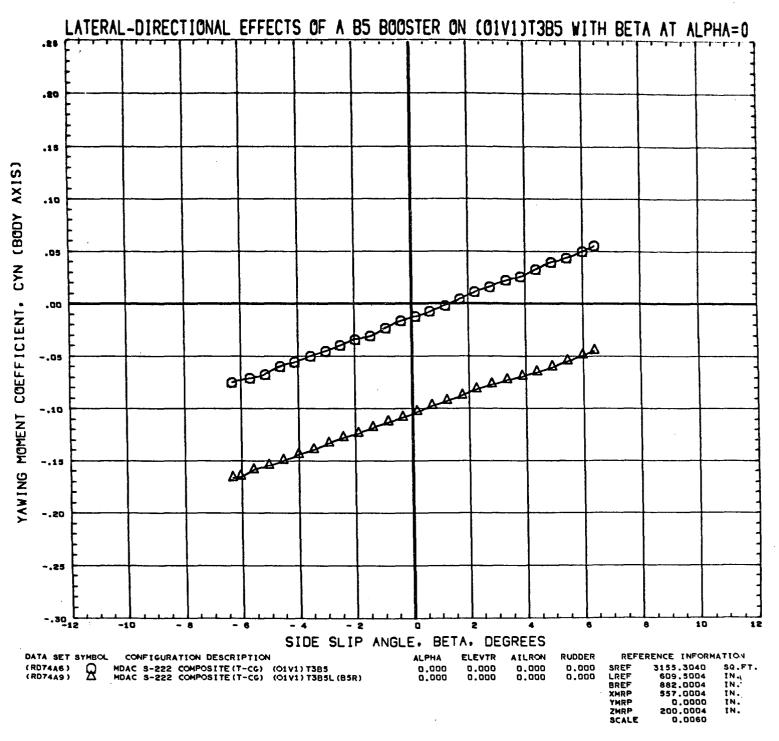
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